E and L P

MAY 1, 1960

NEWS IN PERSPECTIVE

ECONOMIC CLIMATE

ENTIRE NEW NATION BY 2000--That's the construction industry's task ahead. Virtually everything you can name will be more than duplicated before the end of this century. Says the U. S. Chamber, "Try to imagine your own line of business standing still in such an upheaval!" (Investor-owned electric utilities' share in '60: $3.5- of $37-billion estimated total for all U. S. business.)

SIDEWISE MOTION in the economy is causing concern--probably far more than is merited. Severity of the winter cut into employment and pushed other figures downward as well.

BUSINESS OUTLOOK, as seen by the National Association of Purchasing Agents, still is for "good but not booming" activity. This conclusion is a compound of "general reluctance" to add to inventory, "ready availability" of all materials, and a belief that "prices will not rise much." This last looms large in view of the high cost of money borrowed only to be tied up in unnecessarily large inventories.

PRICE STABILITY is a major factor in the apparent slowdown. It is forcing a reassessment of the business attitudes that have prevailed during the postwar period. Over the year, rising prices spurred inventory accumulation and no doubt helped some firms to get off the hook of managerial error. Removal of this seeming life preserver, inflation, is putting a premium on good management and minimum waste.

FEDERAL BUDGET PICTURE has changed considerably. Instead of a surplus of $200-million for the current fiscal year, it looks as though there will be a bare balance. This is attributed in large part to lower tax payments by corporations. In fiscal 1961, however, the federal surplus is likely to be substantial--measured in billions of dollars. This enhances the prospects of tax reductions next year.

MANAGEMENT VIEW

PAST RECORDS ALONE will not meet the competition, the EEI Annual Sales Conference was warned by its chairman, Detroit Edison V-P E. O. George. Opportunities of the '60s offer challenges to develop new sales programs, he advised. (Meeting about the same time, the Gas Appliance Mfrs. Assoc. delegates termed their outlook for '60 as very good and drew new optimism from their preview of new and strengthened promotional campaigns.) EEI's "You Live Better Electrically" philosophy will hammer this year's residential market . . . the housewife will be sold on the flameless advantages of the range, water heater, dryer, heating and cooling, and Medallion Home--all critical gas competitors. (See report of EEI Sales Conference on page 42.)

MADE IN AMERICA--When American Electric Power awarded $11.5-million in contracts for the proposed Smith Mountain combination hydro-electric project on the Roanoke River in Virginia, AEP's Pres. Sporn commented: "We are particularly pleased to make this announcement because we were able to purchase all of the major equipment for this development from American industry. I would like to commend the manufacturers at this time for the cooperation which made this possible."

PRESSURE SUPPRESSION WILL ADD significantly to atomic powerplant engineering knowledge, if additional tests bear out our optimism, PG&E's Pres. Sutherland observed in announcing that PG&E is going ahead with the tests. PG&E decided to test further the new containment idea, rather than switching to conventional dome-type containment for its Eureka plant, after the AEC's Reactor Safeguards Committee advised the Commission "the idea . . . has merit (but) further tests are necessary." Said Mr. Sutherland: "We have decided to go ahead with the pressure suppression tests because we are convinced the idea deserves the fullest possible exploration." (AEC hearings on the project have been postponed at the company's request until it completes further tests and asks for another hearing.)

MOVES IN FINANCING indicate fluid picture, suggesting special alertness on the part of utility management. Examples: To find the yield level at which investors will again show active interest in corporate bonds, Carolina P.&L. offered a $25-million issue for competitive bidding preparatory to public offering, got 4 of 5 syndicate bids at a 4⅞-percent coupon rate; more and more utilities are reported to be shifting bank loans to long-term public debt. (Meanwhile, Irving Trust reports--on page 9--that electric utilities by mid-year will come close to completing half of the estimated total for 1960.)

RESERVE UTILITY ZONES for transmission needs?--PG&E's Jack W. Frost suggested this possibility to the recent PCEA-PGEA Administrative Service Conference. The PG&E right-of-way agent also offered, as "food for thought" these possibilities: "Should we not have joint utility and planning boards of state-wide scope and authority to review our mutual plans and problems? Should not the private utility, like the Federal agency, have the right of immediate possession?"

WASHINGTON INFLUENCE

TWO MORE ANTI-UTILITY BILLS have been introduced in the House by Rep. Moulder (D., Mo.). One would make spending for ads "not designed to promote the sale of goods or services" non-deductible. The other would prohibit electric utilities subject to FPC from treating expenditures or contributions for "propaganda advertising, lobbying and other political" reasons as a rate expense. Similar Senate bills were sponsored by the late Sen. Langer.

GUILTY PLEAS to charges of price-cutting have been entered in the government's antitrust suits in Philadelphia. When the Judge disallowed pleas of nolo contendere, Allis Chalmers pled guilty to two indictments and I-T-E Circuit Breaker said guilty to one count. The remaining companies have pleaded not guilty. GE and Westinghouse have asked the government for a bill of particulars.

TO ENJOY SOVIET "GLORIES," Bryce N. Harlow told the Southwest Electric Conference, "We would have to abandon three-fifths of our steel capacity, two-thirds of our petroleum capacity, 95-percent of our electric motor output, destroy two of every three of our hydro-electric plants and get along on a tenth of our present volume of natural gas. We would have to rip 14 of every 15 miles of our paved highways and two of every three of our mainline railway tracks. We'd sink eight of every nine ocean-going ships, scrap 19 of every 20 cars and trucks, and shrink our civilian air fleet to a shadow of its present size. We would cut our living standard by three-fourths . . . and then we would have to put about 60-million of our people back on the farm." The Deputy Asst. to Pres. Eisenhower also reiterated the Administration's "power preaching--teamwork pays . . ." (See page 31.)

TVA FUND RAISING, starting probably in fall, is to be handled by Lehman Bros., N.Y. $50-million is to be raised for generating capacity expansion.

BPA IN THE BLACK AGAIN by 1970--That's the way Administrator Wm. A. Pearl sees it. Condition: the Authority must be able to sell all available firm power and "a reasonable amount of high-grade secondary power."

SCIENCE & TECHNOLOGY program of the U. S. Dept. of Commerce is conducted on a level that is "deplorably low," says an advisory committee of the National Academy of Sciences. To fulfill its responsibilities in this important role, the committee recommended the present $22-million budget of the agency should be at least doubled as early as possible, with a longer term goal of a $75-million budget.

REA BORROWERS could not invest in financial obligations of the U.S. that would bring more interest than the REA loan rate in future contracts under a measure introduced in the House by Rep. Michel (R., Ill.). REA Administrator Hamil has admitted that borrowers now hold about $228-million in government bonds.

ANTITRUST SUIT has been brought against Alcoa for its acquisition of the Rome Cable Co. The Justice Department charges violation of the Clayton Act by substantially reducing competition and tending to create a monopoly in its civil suit in Syracuse, N.Y. Alcoa had 1958 sales of more than $32-million in aluminum wire, cable, and conduits; Rome had 1958 sales of more than $40-million in aluminum and copper cable products.

Antitrust Chief Bicks says the divestiture suit has two purposes: "(1) to dissipate the anti-competitive effects of the acquisition, and (2) to halt the trend toward economic control of the wire and cable industry by a few dominant producers of the raw materials used in wire and cable production."

CLARIFICATION BY SEC of its position on deferred tax accruals accounting has been made by its chief accountant, Andrew Barr, in a letter to the American Institute of CPAs about the policy statement of last February. He stated, "It was not the Commission's intention by the publication of this release . . . to make mandatory the use of deferred tax accounting beyond the requirements of generally accepted accounting principles."

INDUSTRY SIFTINGS

UPWARD TREND IN ORDERS is being reported by more and more suppliers to the utility industry. "We intend to capitalize on that increased volume to the best of our ability," Westinghouse Pres. Cresap told his stockholders in their annual meeting. And, Combustion Engineering reports that unfilled orders now stand at an all-time high of $390-million, with a large part of the new business related to large steam turbine generating units.

"BEST BARGAIN" BELIEVED--In a Gallup poll for LOOK magazine, three out of ten persons named electricity as the best bargain of their expenses. "Other utilities" gained 19-percent of the preference, so taken together, they accounted for nearly half of the national preference.

UN-ENVELOPED ANNUAL REPORTS are creating "widespread favorable share-owner reaction and no significant unfavorable reaction," reports "The Exchange," published by the N.Y. Stock Exchange. More immediate attention is attracted, according to the companies (including Florida P.&L. and Commonwealth Edison). In breaking a "custom barrier" with the practice, they successfully appeal to a trait close to the hearts of investors --making "a change that is a mark of corporate efficiency."

CIVILIAN REACTOR COSTS through 1959 totalled about $358-million, with about $504-million of the estimated total costs for 46 projects remaining to be incurred. (Speaking to the Nuclear Congress recently, Bechtel's W. Kenneth Davis urged engineers and scientists working in this field to be more "cost-conscious," rather than to be preoccupied with "economics.")

ATOMIC TAX BOON for a community welcoming a new nuclear powerplant was measured for the first time by the Village of Buchanan, N.Y. A bonanza for the 2,117 villagers who are now neighbors of ConEdison's Indian Point Station, as disclosed in the Village's new budget, is reflected in a tax-rate drop from $20.20 to $17 for each $1000 of assessed valuation. And, village spending will jump from $94,000 to $211,000.

NEW MARKETING AIDS being distributed by General Electric aim at "erasing the hazy middle-ground between buyer and seller" (Pub. GET-3029) and "providing a detailed approach to the systematic appraisal of product value in business purchasing." (GED-3877).

NEWS IN PERSPECTIVE

FREE ENTERPRISE VALUE is demonstrated more clearly in the development of our nation's great power systems than in any other way, contends Florida P.&L. in a dramatic series of newspaper ads. The emotional appeal of youngsters in hint-of-their-future poses gives the series unusual impact. (The utility also ran an income tax-time series proposing "Two Ways You Can Save On Income Taxes," one being "Keep the government out of business.")

WHEN TO BUY COAL: If you are a Northwest utility and it may take until 1968 or later to bring in new hydro (the Peace or Columbia) . . . to avoid the chance of "putting our customers in a serious position," says B. C. Electric's Pres. A. E. Grauer, you purchase coal deposits (at Hat Creek) which may have a generating capacity equal to full development of the two big hydro power sources.

GE CONTEST TIME--"A roomful of lighting" is the big prize for users of GE Power Groove fluorescent lamps who can guess closest to the total savings to all who install PG lamps in the year beginning June 1. Distributors and users of GE dry-type transformers who guess closest to number of such units sold in '60, then rank QHT transformer features in order of importance, can win expense-paid vacations to Miami, NYC, Las Vegas or LA.

WEST KENTUCKY COAL CO. does not have to comply with its contract with Tampa Elect. Co., the U.S. Circuit Court of Appeals has ruled.

NEW REGULATORY ACTIONS reported around the country include these decisions:

Pacific Power and Light was denied rate increase by the Washington State Commission, and PP&L's fair value rate base testimony was denied in its entirety. (See EL&P analysis in May 15 issue.)

Puget Sound Power and Light was granted 90-percent of its requested increase in rates by the Washington State Commission. (No fair value rate base evidence was introduced by the company.)

Illinois Supreme Court reversed itself on a re-hearing and allowed taxes to be normalized in Alton Water Co. case.

California Commission ruled that only actual taxes are to be used when utilities avail themselves of Section 167 of the Internal Revenue Act of 1954.

POWER FROM SEA TIDES is to be evaluated for feasibility in 1962-65 by Soviet officials. The proposal: to build three stations in the Soviet North by the '80s, providing 15.8-million kilowatts!

NAT. SAFETY COUNCIL'S Public Interest Award for '59 recognizes EL&P, among a number of organizations in the mass communications field. Again, as in '58, EL&P is only recipient in electric power industry.

LOOKING AHEAD... FINANCIALLY

--From Irving Trust

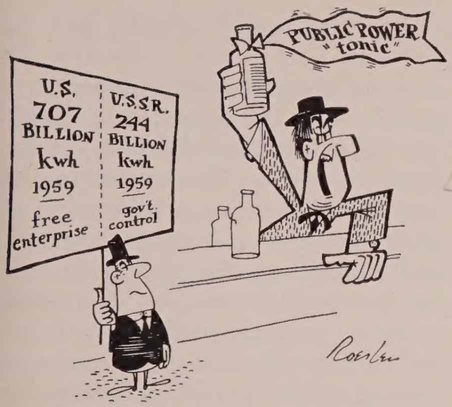
Second quarter public offerings by companies with assets of over $35-million:

	Second Quarter	Completed	Coming
Electric			
Bonds	$349	$ 89	$260
Preferred	4	4	0
Common	71	10	61
Total	$424	$103	$321
Gas			
Bonds	$117	$ 18	$ 99
Common	43	0	43
Unidentified	11	0	11
Total	$171	$ 18	$153

Telephone financing for the second quarter totals $105-million.

According to the above figures, less than half of the estimated total for 1960 will be completed in the first half of the year--electric will come closer to the halfway mark than will gas. Offerings have been spaced fairly well and potential conflicts averted.

However, the problem of conflict in information meetings has come up twice in the last month. We recommend that if at all possible meetings not be scheduled at the same hour on the same day. People in the financial community feel strongly about being able to hear all companies.


PUBLIC POWER "tonic"
U.S. 707 BILLION kwh 1959 free enterprise
U.S.S.R. 244 BILLION kwh 1959 gov't. control

"Go away boy! You bother me."

Pres. Eisenhower's Deputy Tells Utilitymen

"Only Teamwork Can Do the Job" . . . But Don't Give Up Local Control to Federalism

"Teamwork pays—excessive Federalism fails."

This philosophy of the Republican Administration—as well as what it has accomplished and what threatens it—was described for electric power industry executives meeting recently at the Southwest Electric Conference in Chandler, Arizona, by the Hon. Bryce N. Harlow, deputy asst. to the President.

The White House spokesman's "word of warning" was perhaps most significant. Mr. Bryce advised:

"A new assault on teamwork is lurking menacingly in the wings. Recent statements from significant political sources suggest that certain public hopefuls are preparing to mount a new attack on America's light switches by striking, not at the *production* of kilowatts, but rather at their *transmission*.

"There is ominous implication that all across the nation Uncle Sam *alone* should build gigantic criss-crossing webs of supervolt transmission and system interconnection lines, on the premise that full integration—full pooling—on a regional basis may be desirable or necessary. Thus the baleful instinct crops out again, despite the somber teachings of history—the Federalist instinct that if a need exists, only Ulterior Uncle can meet it. Plans being hypothesized disclose an objective we thought we had left behind—that of dominating America's electric power industry, this time through Federal control of a Federally-planned, Federally-financed, Federal supervolt integrated transmission system.

"To me it seems in order for today's producers, transmitters, and distributors of electric energy to reassess the strides made over the past 80 years, analyze the requirements of today, determine what is needed for tomorrow, and then move heaven and earth to ensure that the needed steps are taken in a thoroughly responsible way.

"Every locally controlled public utility district in the nation, every REA cooperative, every private utility—indeed, every local or regional combination of these entities

Since '52: 11-Million New KW—vs. 3-Million Before!

"It really is a pity that kilowatts can't register to vote!"

Observing this, Bryce N. Harlow, deputy assistant to the President, compared the record of the present Administration on electric energy with the previous 20 years of Democratic Administration:

"During the 20 years before President Eisenhower took office, the two Democratic Presidents, the three Democratic Secretaries of the Interior, and successive Commissioners of Reclamation effervesced enthusiastically over the Federal role in the development of electric energy. When these declaiming decades were over, we emerged with a kiloton of kilowatts on the mind, but appallingly few on the line. This shortfall was the predictable result of an extremist policy of 'Federal dams or no dams at all.'

"During the 20 Federalist years 1933 through 1952 some 54.5-million kilowatts of net generating capacity were installed. But during only seven teamwork years under Dwight Eisenhower more than 77-million kilowatts were added. By the end of 1960, capacity additions in the teamwork years will exceed 90-million kilowatts.

"I rather believe these data dispel the fantasy, not surprisingly revived here on the eve of a Presidential election, that the present Administration and its policies have 'crippled' America's electric energy production capability. If you'll pardon the metaphor, we in fact took a politically drugged patient from a Federal wheelchair, weaned him from over-addiction to the public treasury, and ever since he has been so disappointingly healthy, vigorous and self-reliant that his former physicians have frustratedly snapped their Federal hypodermics and surrendered to a political psychosis, acute, anxiety type.

"It is only reasonable to believe that the results we have achieved in 80 years of commercial electric power development ought by now to have convinced even the most fanatic Federalist of at least three facts: first, in electric power America has advanced spectacularly for 60 of those 80 years because of spirited teamwork in generation, transmission, and distribution; second, persistent attempts over a 20-year period to federalize these eforts came close to stifling this nation's electric power potential; and, third, restitution of the triple partnership approach brought us in less than eight years just beyond where we should have been years before," observed the White House aide.

working together in any phase of the power industry—would be loath," I should believe, "to surrender to Federal bureaucracy their prized and productive local control."

Mr. Bryce warned, too, of the confusion involved in "what people sweepingly refer to as 'public-versus-private-power.'" He described it this way:

"Ordinarily, when people prate of 'power policies,' there is a bewildering botching of terminology. In the interest of accuracy, we need to recognize our power complex for what it really is—private power, non-Federal public power, and Federal power—and it is time we were done with the public-versus-private oversimplification. Only when the public knows this power triumvirate for what it really is can they clearly comprehend and lend their support to the effort that has crowned your industry with such amazing success.

It is this triple-partnership team so earnestly supported by President Eisenhower that gets the whole job done. It is a kind of teamwork that vigorously flourishes in a governmental philosophy in which the present national Administration deeply believes—the old-time, tried and true philosophy that that government is best that is kept closest to the people, in contrast to one centrally-managed by a distant bureaucracy that is largely insulated from and hence is largely insensitive to the folks back home.

"Now, of course, an electric utility of necessity has a monopolistic character. It follows that utility ownership, whether private or public, must, if it is to survive, be ever sensitive to the needs and attitudes of the people being served. Neither type can be so managed as merely to enrich a managerial hierarchy, and each bears a grave responsibility in resource development and the supply of electric energy. It is at the very heart of our Federal concept that States and local communities shall have full authority to determine for themselves whether their utilities should be publicly or privately owned and operated.

"The advocates of each system are, at the very least, ardent, but I must say that those who insist upon no public power at all are as unrealistic as those who cry out for Federal power and Federal dams or no power and no dams at all."

The Administration representative offered this promise:

"The President has sought unremittingly to make sure that his Administration practices its own power preachings. We say—and we mean—that Federal officials must not abuse their authority by attempting to control or influence local decisions on public or private ownership of electric utilities. We have fought—and we will keep on fighting—those officious arrogants who would Federally superimpose upon a State or a region utility developments offensive to the citizens concerned."

Mr. Bryce counseled his audience of utility executives about the future:

"Even in your area of surging enterprise America cannot rest her oars. It is solidly estimated that over the next 20 years we must somehow come up with a staggering total of 262-million more kilowatts.

"Incredibly, we must build its productive equivalent of the 1¼-million kilowatt Hoover Dam almost monthly for the next 200 months. This means that we have to raise from some source capital funds amounting to some 2¼-billions a year for the next 20 years just for additional generation. That comes to over $6-million a day for the next 7,300 days, not including the dollar outlay needed for transmission and distribution.

"Surely, even those heretofore obsessed with the 'Federal kilowatt or no kilowatt' idea cannot believe that the United States Congress will authorize, or that the taxpayer will abide, Federal outlays of tax money approximating $50-billion over the next 20 years to meet all of America's electric power requirements. Obviously only teamwork can do the job. And if we are to have teamwork it is no less obvious that we must keep the right kind of governmental philosophy in Washington. There in a nutshell—maintaining that philosophy in the power centers of our government—is the key to your own and America's future," Mr. Bryce concluded in his address for the Southwest Electric Conference. (For a report of the Conference, see page 41.)

Seattle City Light Tells How to Go Underground

Seattle City Light recently unveiled its proposed program for placing wires underground consistent with current revenues . . . and for improving the appearance of Seattle's electric distribution system.

An estimated $7,680,000 will be spent by City Light in the first six years of the proposed program, prepared under the direction of Lighting Superintendent Paul J. Raver. Seattle's Mayor Clinton explained that the plan was a combination of extending the underground system and improving the appearance of the overhead system, as "even with today's technological knowledge and equipment a 100-percent underground system would be financially impractical."

The Mayor added: "This program will bring needed improvements to the City with the least possible impact on Seattle's low rates," said the Mayor. "Dr. Raver feels that the $1,280,000 annual cost of the program for the first six years can be absorbed without a rate increase at the present time.

"About $4,440,000 of the six-year expenditure will be spent for putting facilities underground. The remaining $3,240,000 will go for clearing up existing overhead facilities."

Dr. Raver explained that these were system improvements to be absorbed by City Light and that in addition, there would be localized undergrounding or relocating of facilities through local improvement districts or other community action.

"We are allocating $15,000 annually for setting up an office or a coordinator to promote such activities as well as to coordinate City Light's work," said Raver. "Another $25,000 annually has been allocated for preliminary engineering work to further local improvements.

"This will also permit us to intensify our cooperative efforts with builders in putting electric facilities for new housing developments underground.

"Conversion of overhead facilities to underground through community or individual financing is an essential part of the program as it is the only equitable way of obtaining localized improvements."

WASHINGTON OUTLOOK

by RALPH ELLIOTT
Washington Editor

Co-op Profiteering At Taxpayers' Expense Is Due For Cut

A scantily publicized but highly important aspect of the federal rural electrification program was the subject of some penetrating discussion during recent hearings on Capitol Hill. It has to do with the utilization of cash reserves of REA-financed electric co-ops.

Striped of the frills, the basic question involves the extent to which the co-ops should keep surplus funds invested — predominantly in Government bonds — at rates of interest substantially higher than the 2-percent they pay on their REA loans, as against ploughing such funds into additional plant or using them to make advance payments on their loans.

The problem has been taking on added significance at a fast clip in recent years, as more and more co-ops have matured and prospered. Now it has become a matter of real concern to REA, not only from the standpoint of what is sound lending policy, but also its potency as a breeder of eye-catching criticism of the REA program.

Legally, the REA is in no position to tell its borrowers what to do with their surplus cash resources. But from the standpoint of its loan policy, the agency can, and apparently intends to, deal effectively with the problem in the important area of co-op system improvement or expansion requiring new capital. In other words, the overall financial set-up of borrowers seeking additional loans will be coming under closer scrutiny. A co-op seeking additional 2-percent money may have to show why the size of the new loan should not be pared down by whatever amount of money it has socked away which is in excess of that required to meet repayment schedules and operating needs.

This, at least, was the way the direction signal was pointing after the lively go-around that took place during the hearings before a House Agriculture Subcommittee regarding REA loan funds for fiscal 1961.

The subject was opened by Rep. Santangelo (D-N.Y.) when he asked REA Administrator Hamil to comment on "complaints" he had heard that some electric co-ops "have cash funds and they are buying Government bonds at 5-percent while they are borrowing from REA at 2-percent." Hamil explained that the co-ops cannot invest their loan funds in securities, but that they do invest accumulated reserves in Government bonds and other types of securities. He added that in "a few cases some of our borrowers might be criticized for having excess reserves."

Santangelo suggested that REA look to the possibility of providing in its loan contracts for shortening the amortization period in the event the borrower builds up excess reserves, "so that in the future we can eliminate this criticism, we can eliminate this profiteering at the expense of the Government." Otherwise, he warned, "the forces which are trying to raise the rate of (loan) interest, which in my opinion will endanger the program, will be getting stronger and stronger, and then maybe the REA would not be as successful as it has been up to this point."

Hamil pointed out that only in recent years have many of the co-ops accumulated appreciable cash reserves, and that he has repeatedly urged them to use such funds either for advance loan repayments, or for adding needed plant in order to build up net worth. He said he also had suggested an arrangement whereby the co-ops could deposit excess cash in the Treasury, via REA, and could withdraw the money for any purpose for which loan funds otherwise could be made available. Their Treasury deposits would draw interest equivalent to the REA interest rate. But such arrangement, Hamil said, would require legislative action.

During a discussion brought on by Michel's query as to what is considered a "reasonable" or an "excessive" reserve, Hamil declared: "We have been in the process of changing our relationships with the borrowers in this particular aspect and that is coming with the increased financial stability of the borrowers."

Subcommittee chairman Whitten (D-Miss.) put his finger on the solution to the problem when he established that REA has the authority to determine whether a loan is needed or whether the co-op has sufficient funds above essential reserves to meet the need; also that REA in the past has not been making such specific determinations. Turning to Hamil, Whitten said: "As long as the REA has the full authority under the law to determine the need for loans, you have the same right to put conditions on it. That is, if you decide they have ample money for this purpose above normal reserves, you are in a position to say go ahead and use your own money."

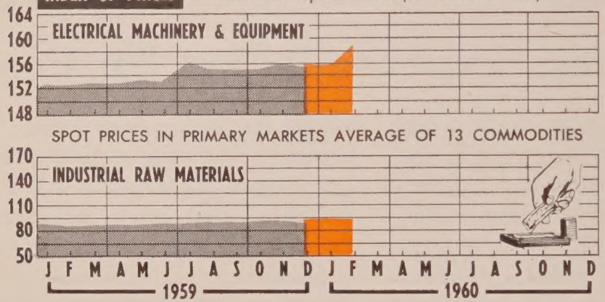
And those are the very lines along which REA is now thinking.

The subcommittee hearings, in addition to shedding considerable light on the subject, served to underscore the significance of Clyde Ellis' attempts to get his NRECA's hands on the co-ops' reserves. His plan is to have the money pooled with the Association as trustee, for investment in Government bonds and "blue chip" industrials, with accumulated interest to be invested in "high grade" common stocks. So far the co-ops, as represented on the NRECA board, have turned thumbs down.

MARKETING GUIDEPOSTS

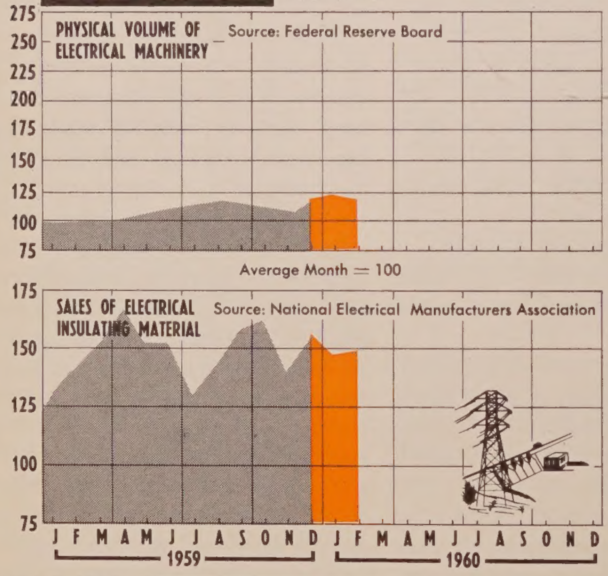
INDEX OF PRICES

Source: U. S. Dept. of Labor: (1947-1949 = 100)



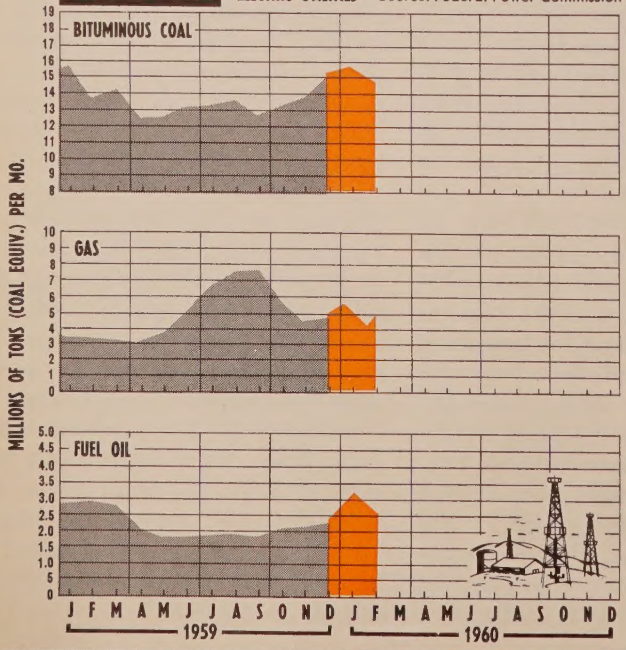
ELECTRICAL MANUFACTURING

Based on 1957

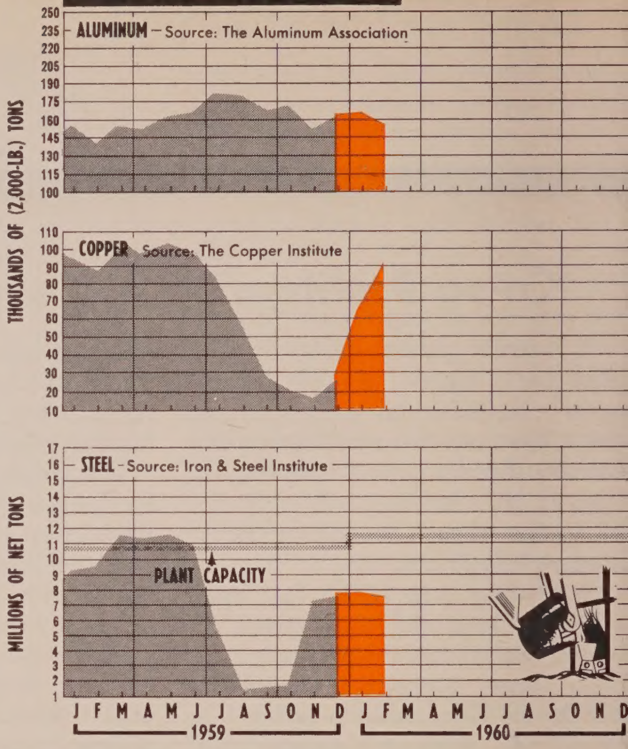


FUEL CONSUMPTION

ELECTRIC UTILITIES Source: Federal Power Commission

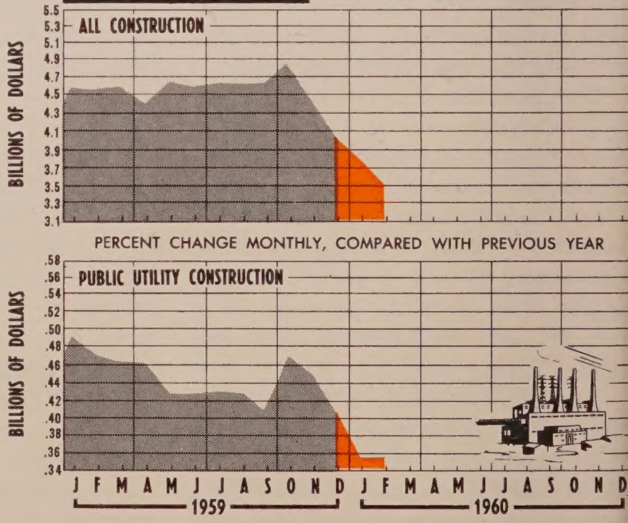


U. S. PRODUCTION OF PRIMARY METALS



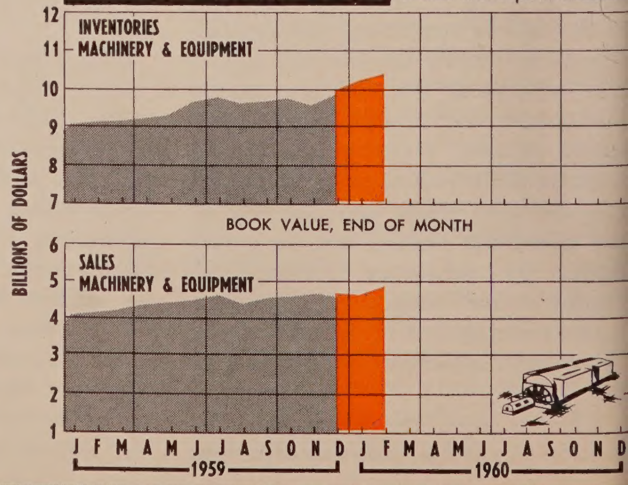
NEW CONSTRUCTION ACTIVITY

Source: U. S. Dept. of Commerce



MANUFACTURERS' INVENTORIES & SALES

Source: U. S. Dept. of Commerce



REGULATORY REVIEW

acific Power & Light Rates Hiked 11% By Oregon Commission

ompany receives 76% of amount originally requested.
air Value based on trended Original Cost denied.
ate of return of 6.1% on forward net original cost rate base ranted.
estricted earned surplus not deducted from rate base.

THE Company's original request for an increase of $4,566,000—ie first general rate increase in early 50 years—was reduced by the ommission to $3,545,000, (or approximately 76 percent of the original amount), but Pacific Power & ight Company did considerably etter than Portland General Electric Company, whose rate increase rder was made at about the same me, and received only $1.9-million the $5.2-million originally requested. However, Pacific's petition r increased rates in the State of ashington in the amount of $1-million was turned down by the ashington Commission.

Determination of the Rate Base

On cross-examination, the Company's witness admitted that, since e merely trended the original cost plant to present values, his study d not show the present cost of replacing the company's existing operty.

The next series of questions was esigned by the Commission to destroy the credibility of trended iginal cost. When asked how he ive weight to technological improvements in the production, ansmission and distribution of ectric power, the Commission's rder stated that " . . . the witness dicated that he tried to accomplish this by using his best judgment in assigning lives to all of the operty which would reflect obsolescence or anything else that ight bring about retirement of the operty. The witness was unable state what degree of weight he gave to this factor of obsolescence in assigning lives to the property. He also felt the indexes used would, at least in part, reflect such improvements."

The Commission's Order continued that: "An examination of the witness' exhibit, (Exhibit 3) however, discloses that in practically every account, the older the plant, the greater the conversion factor and the higher the value of the plant as of December 31, 1957. *No adequate consideration appears to have been given to the inefficiency or higher operating cost of the older equipment or to a comparison of the efficiency of newer versus older items in the accounts trended.*"*

The next step in all such proceedings where the staff and the Commission are hostile to a present fair value rate base is to attack the valuation of some minor and inconsequential piece of property. In this connection the Commission's order noted in part: "*Similar examples are the use of, for lack of a fence index, a composite of steel post and woven wire fencing indexes,** without an explanation of the percentage each bore to the whole; the use of bare copper wire index and index for steel wire to obtain an index for Copperweld M-102; and, the use of structural steel shape indexes for a sheet metal building. Many other individual examples of a similar nature could be cited. Much of the trended cost study is based on the use of published manufacturers indexes which were designed *to cover their own specific needs, and not the actual material and construction costs of the Company.*"*

The staff's position with respect to a fair value rate base is to the effect that its determination " . . . *is impractical, in that it is cumbersome, time consuming, expensive, difficult to check as to accuracy and soon obsolete; that utilities operating in this state and the State of Washington, where no weight has been given to present value in the determination of the rate base, have succeeded in attracting several hundred million dollars of capital, both debt and common equity.*"*

The Commission also excluded from the rate base $1,541,000 of plant acquisition adjustment.

In determining the revenue requirements of the Company, the Commission allowed a 6.1 percent return on a 1959 original cost rate base, of which eight months were actual and four months were estimated.

Restricted Earned Surplus

With respect to the restricted earned surplus and of $14,173,000 arising from the use of Necessity Certificates, the Commission noted in part: "Since the restricted surplus has been invested in property used and useful in providing service to the public, and in view of the prior order of the Commissioner directing that, in determining the rate of return to be granted the Company in any future rate proceeding due consideration be given to the fund in question as interest and dividend free capital available for use by the Company, the "Restricted Earned Surplus" will not be deducted from the rate base but will be hereinafter considered in the equity portion of capital structure in determining cost of capital."

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*Italics supplied

NUCLEAR NEWS

LARGE PLANT CONSTRUCTION, now being emphasized, will not give the U. S. as much progress as we would get, in the long run, from experiments. Atomics International's Chauncey Starr stressed this point in the "Frontiers" hearings held recently by the Joint Committee. Other top nuclear experts, participating in "a seminar on advanced reactor applications," contributed these most significant views for the Congressional survey:

FUEL CYCLE ECONOMICS—the prime goal being to use nuclear fuel in the most economical cycle—should be the way nuclear power technology is bent, advised ANL's Bernard Spinrad. "Capital costs can be reduced, but there is no particular virtue in nuclear power unless the intrinsic cost of the nuclear fuel is preserved. The low cost of the fuel as mined represents the primary advantage—a fundamental fact obscured by the current tendency to evaluate power reactors by reactor category." He contended that the characteristics of the fuel cycle, rather than the characteristics of the coolant or other factors, govern a reactor concept.

HIGH-TEMPERATURE DEVICES are needed most, said Dr. Walter Zinn, responding to the question: *What should the U. S. be doing in the field of advanced reactor concepts that it is not now doing?* Pencil and paper work on high-temperature work needs to be implemented with laboratory work, he added; and high temperatures must be utilized in a reactor environment . . . where we should find out if we really have a chance of high temperature operation. Concerning uranium supplies, Dr. Zinn warned that at the present rate of fuel burnup, we will run out of low-cost supplies in a relatively few years. "We must get breeder systems going while inventories are still supplied with sufficient low-cost uranium to offset the cost of the more expensive fuel," he advised.

BREEDER REACTOR SYSTEMS are the most important of the advanced reactor concepts, points out ORNL's Dr. Alvin Weinberg. It will be possible to develop an economic breeder reactor, in his opinion. He also stressed the need for (a) exploring the use of thorium in the long-range future of reactors, and (b) for concentrating work on the area of waste disposal, a problem certain to grow in the future. However, he does not think nuclear energy will be an important power source within the next 20-25 years.

GOVERNMENT-FUNDED DEVELOPMENT of more advanced concepts is regarded as a necessity, in the opinion of John W. Simpson of Westinghouse. Any pushing of work on high-temperature systems, which could be applied to future power systems, would be beneficial, he observed in his Congressional testimony.

ANSWER TO FUSION POWER lies in the study of hot gases, Dr. Arthur Ruark told the JCAE. The AEC research chief predicted that "thermonuclear temperatures may be achieved in a relatively short term of years," although feasibility may take longer. As for the possibility of a Russian lead in fusion research, Dr. Ruark said: "I state without fear of contradiction that in this field we have an outstanding position. We intend to hold onto it."

(Editor's Note: For excerpts from additional testimony in the "Frontiers" hearings, see page 39.)

CONVERSION OF HANFORD TO POWER has received a shot in the arm from the FPC's Bureau of Power. Its study showed that, under certain circumstances, adding power generation to the nuclear plant could be economically feasible . . . with benefits equal to those from steam-generated power in the area. (The JCAE was considering including conversion of the dual-purpose reactor in the AEC authorization bill.)

REACTOR SAFEGUARDS COMMITTEE opinions on two private projects checked out one, questioned the other. On the *Consumers Power Co.* project for northern Michigan, the Committee concluded: "A boiling water reactor of this general type and power levels can be constructed at the proposed site with reasonable assurance that it may be operated without undue risk to the health and safety of the public." But, on PG&E's Humboldt Bay project, the Committee questioned (a) how much of the total reactor system will be housed within the vapor suppression chamber, and (b) the suitability of the steam condensing system. Indicating the view that further tests are necessary, the AEC Advisory Committee concluded: "While the concept has merit, it has not been demonstrated that the vapor suppression proposed can be relied upon to protect the health and safety of the public at this site." (See page 7.)

NATIONAL BUREAU OF STANDARDS design study is being undertaken as one step in a NBS program aimed at designing and building a nuclear research reactor to be used in basic research on materials and in establishing standards for various types of nuclear measurements. Allis-Chalmers is undertaking the study for NBS, working on an advanced version of the "tank-type" CP-5 reactor operating at ANL. The heterogeneous heavy water-cooled and moderated reactor employ enriched uranium fuel elements, operate at power levels up to 10-mw.

EXTENSIVE TRAINING PROGRAM needed to build the operating staff for Commonwealth Edison's Dresden Station involved 11 man-years of classroom work, 38 man-years of field training. Examinations required by AEC for operator's license were taken by 22 persons.

At Ground-Breaking for New R & D Center

Westinghouse Evaluates "New" Methods For Electric-Power Generation

Fascinating and promising methods of creating electrical energy, some of which produce electricity directly from heat or chemical reactions, were described and present state of development outlined at a press conference held recently by Westinghouse at its Research Laboratories in Pittsburgh, Pa. There are literally dozens of methods for generation of electric power, said Westinghouse scientists, but all have one thing in common: they tap some form of stored energy—coal, oil, natural gas, uranium, or other source—and convert it through one or more energy transformations into electricity.

Prime reason for investigation of new and better methods for producing electrical energy is the conclusion that almost certainly within the next century supply of energy from conventional fuels, which now accounts for some 95-percent of our needs, will be inadequate. Question, said Dr. S. W. Herwald, Westinghouse vice-president, research, is not whether we *shall* reach this state of affairs, but *when*. Coupled with the quest for new prime energy sources such as fission, fusion, or solar power, is the conviction that we must begin now to look for new ways to exploit more effectively the diminishing fuel supply at our command.

Much of the effort today is directed toward converting stored energy directly into electricity, since each transition from one form of energy into another is always less than 100-percent efficient. Direct-conversion systems avoid these successive losses and in addition have fewer mechanical components as well as providing inherent simplicity, reliability, and efficiency. Four of these schemes they noted, have been under particularly intense investigation: fuel cells, thermoelectricity, thermionic conversion, and magnetohydrodynamics. While these are referred to as new methods, none of them really is new in principle.

Two Divisions of Fuel Cells

Fuel cells divide naturally at the present time into two groups, those operating at under 500C and using high-cost fuels, and those operating at above 500C and capable of using low-cost fuels such as coal or natural gas. High-temperature cells have the important advantage of a better long-range potential as a source of cheap power, said Dr. R. J. Ruka.

Fuel cells have a theoretical efficiency of from 70- to 90-percent, compared with a maximum 42-percent for today's most efficient steam-turbine generators. However, fuel-cell efficiency drops as load increases, and an economical compromise must be reached where efficiency and capital cost, as affected by optimum size and weight of the cell.

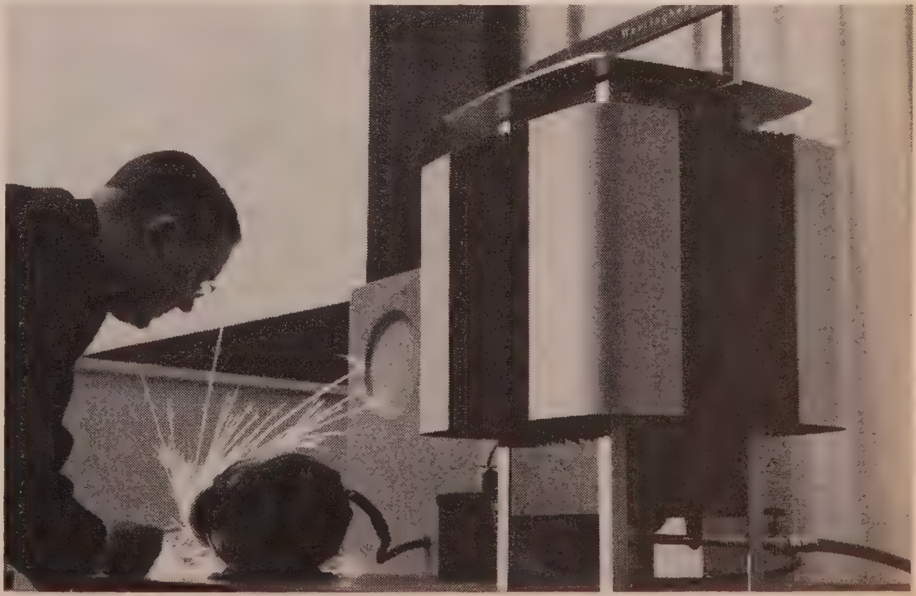
Dr. Ruka concluded that on the basis of estimated power-per-unit-volume at 50- to 60-percent efficiency and present trends in fuel costs, it appears that the high-temperature cells might become competitive with conventional large-scale power sources in ten to 20 years, assuming that the critical research problems can be solved. In the meantime, low-temperature cells below 250C should find special-purpose applications where capital and fuel costs are not of primary importance.

In fuel cell, being tested in furnace at Westinghouse, carbon fuel and oxygen of air react electrochemically to produce electric energy.

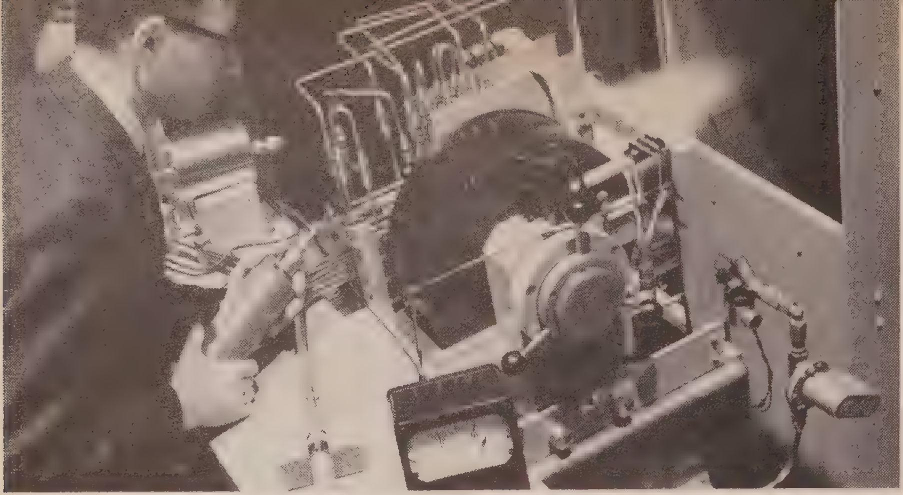
Rating Has No Effect on Thermoelectric Generators

Thermoelectric generators do not have the high theoretical efficiencies of fuel cells and possibly will reach an overall efficiency of 20-percent within the next five years of research and development, said Dr. Stephen J. Angello. However, they retain the same efficiency regardless of rating.

The thermoelectric or Seebeck effect depends upon the fact that when one end of a thermoelectric



Thermoelectric generator is used to power a grinding wheel. A convection, air-cooled device fueled with propane gas, the generator can produce 100 watts.



Magnetohydrodynamic generator was constructed at Westinghouse for experiments using combustible fuels. Unit shown blasts a stream of hot ionized gas through a magnetic field at velocities up to 1,000 miles per hour, producing electric power equivalent of one watt. Background researches, material developments and a general research approach are being pursued to determine if MHD power is to become a reality, say Westinghouse scientists.

material is heated, positively-charged ions in the crystals remain fixed while negatively-charged electrons migrate toward the cooler end, creating a potential gradient capable of producing electrical current in an external circuit.

Output voltage of any thermoelectric material is inversely proportional to number of free electrons in the material but, unfortunately, the reverse is true for conductivity of the material. Thus, any thermoelectric material must be a compromise between potential generated and internal resistance. Again, at high temperatures, materials that are satisfactory at low temperatures begin to lose their effectiveness since at the higher temperatures both positive and negative charges migrate in equal numbers and so no output voltage is possible. However, new materials may solve this problem.

Applications involving large power levels, Dr. Angello concluded, will, of course, depend on an increase in efficiency of thermoelectric power generation, but it is possible now to visualize thermoelectric power supplies in which a nuclear-reactor-energized thermoelectric generator included within a nuclear power reactor but equipped with external cooling loops would approach an overall efficiency of 20-percent for ratings in the megawatt range.

Materials Are Problem With Thermionic Generators

Thermionic generators are even more dependent upon future development of materials of proper characteristics than are fuel cells and thermoelectric generators, said Dr. John Coltman. A thermionic generator is very like a vacuum radio diode in which a heated cathode emits electrons which stream across a vacuum and are captured by an anode, creating a potential difference which can supply electric power to an external load completing a circuit back to the anode.

Energy of the electrons is provided by heating the cathode, preferably to very high temperatures. Losses occur through extra energy required to drive electrons free from the cathode; energy required to force them to enter the anode across its barrier; and through heat radiation to outside of the device.

Within this thermionic tube, a glowing wire emits electrons, causing current to flow in ionized cesium gas.

Application of thermionic converters for commercial generation of power would be most favorable if the thermionic element were used as a topping unit for a nuclear steam plant, Dr. Coltman continued. This takes advantage of high temperatures available from the fuel. A thermionic unit operating with 20 percent efficiency and topping a steam unit of 27-percent efficiency would provide an over-all efficiency of 42-percent, raising output of a 50-mw plant to 77 mw. However development of such units wil depend largely on solution of problems concerning properties of materials, he cautioned.

MHD Uses Hot Gas for Armature Conductors

In a magnetohydrodynamic (MHD) generator, explained Dr Stewart Way, hot ionized gas travels through a magnetic field which is applied at right angles to the flow and past electrodes which are in contact with the stream of gas. Electrons in the gas are deflected by the field and, between collisions with other particles in the gas, they make their way diagonally to one of the electrodes. An electric current is produced as the electrons move from the anode, through the load to the cathode, and back again to the gas stream.

Voltage at the terminals of an MHD generator is directly proportional to intensity of the magnetic field, velocity of the gas, and distance between the electrodes. An MHD generator will supply maximum power when load connected to its terminals has a voltage drop equal to one-half of the circuit voltage.

Efficiencies in the 80- to 90-percent range are possible when the generator is operated somewha below maximum power but drop to as low as 50-percent near peak power because of I^2R losses. Overall thermal efficiency of a plant utilizing an MHD generator might be as much as 60-percent, compared with the 40 to 42 percent top efficiency for most modern conventional power plants. As in some of the other direct-conversion generators, materials must be developed to better withstand high temperatures sudden temperature changes, and chemical interaction with seeding

Direct Conversion Methods Reviewed for Congressional Committee

Direct conversion concepts received considerable attention from the Joint Congressional Committee on Atomic Energy recently, when the subcommittee on research and development conducted hearings on "Frontiers in Atomic Energy Research." The Naval Research Laboratory's Crystal Branch Chief, Paul H. Egli, identified thermoelectricity as the heat conversion process that is receiving the most attention.

In addition, the NRL representative listed photovoltaic, thermionic emission and fuel cells as the processes receiving the majority of attention. He noted that other possibilities, such as magnetohydrodynamics, pyroelectricity, Curie-point nversions, etc., are not promising except for special applications and must await further developments.

"The most highly developed today are the solar cells utilizing energy n the form of radiation," he said. He pointed out, however, that such cells are limited to small power supplies because of their weight.

The program for developing thermoelectricity is barely started, and a conversion efficiency of 10-percent can be readily obtained, he said. "Using thermocouples with nuclear heat is a promising possibility," he added, "though encouraging early results are by no means sufficient to indicate any kind of conclusion."

Mr. Egli testified that "the most exciting possibility is a fuel cell which would use conventional petroleum products and air as the fuels; and several companies have such cells in early stages of development," he said. He asserted that success in such devices could have a large impact on the whole problem of power supplies. "An efficiency of 60-percent is a very reasonable goal; and this could result in doubling the life of our fossil fuel reserves."

It is virtually certain that direct conversion processes will solve important military problems, Mr. Egli predicted. "It seems reasonable to expect that the progress made in connection with these developments and applications will lead to increasing civilian uses."

Mr. Egli reported that within 3-5 years direct conversion processes are expected to have efficiencies about one-half those of rotating machinery, with operating costs about one-tenth those of conventional facilities, and overall power costs comparable to those of conventional machinery. He explained that direct conversion processes not only would have no moving parts to worry about, but would be set up in parallel so that if half of the system were destroyed the other half would continue to produce.

Another expert, George O. G. Lof, of Resources for the Future, Inc., observed that solar energy seems most attractive for small-scale uses, and that potential applications in the near future seem to be more along the lines of heat than power. "However, considerable research and development are being devoted to solar power processes, and in the long view, electricity and other forms of work will be produced from solar energy in substantial quantities," he said. He noted that estimates have shown that U. S. fuel prices would have to rise two- or three-fold before electricity generated from solar energy by means of flat-plate collectors could be significant in this country.

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materials required to assist ionization of the gas.

Nuclear Fuel May Power New Generators

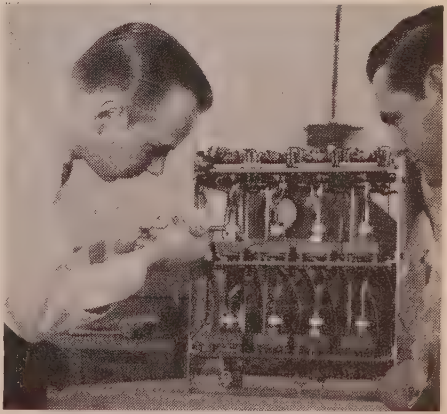
Nuclear reactors offer interesting possibilities for providing the high emperatures necessary for efficient operation of either thermoelectric or thermionic generators, said Dr. W. E. Shoupp. Temperature at the center of uranium-oxide fuel pellets of a reactor is 4150 F. Even though emperature drop from center to outside of the cladding tubes is onsiderable, it is still adequate if generating units can be placed close nough to the uranium. Most efficient way to do this is to place hot unctions of the thermoelectric device close to a hot fuel element of a uclear reactor and cold junctions within the moderator-coolant water.

However, such an arrangement oses a most serious problem since materials must be not only good hermoelectrically but also must withstand intense radiation from he nuclear fuel. Using a heat exchanger to isolate the thermoelectric units from nuclear radiation can be practical in sizes up to ten kw but beyond this the direct method will be required, stated Dr. Shoupp. Similarly, he said, there is no reason why heat source for a thermionic generator could not be an atomic reactor.

All Produce DCL

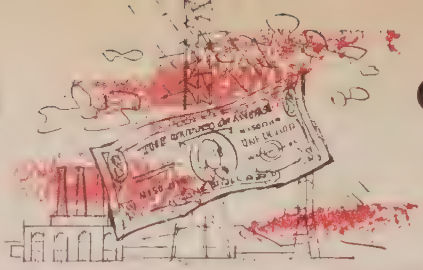
These four unconventional electric-power generators have one thing in common, said E. J. Duckett, they all produce direct-current while the majority of present-day applications require alternating-current. Motor-generators, ignitrons, and the newly-developed semiconductors are all available for inversion of direct-current to alternating-current.

While high-power inversion by the semiconductor method is much greater in cost than by conventional methods at the present time, it is expected that the new inverters will soon become competitive, Mr. Duckett said. The semiconductor static inverter provides significant advantages for: power from unconventional generators; emergency power small power systems; power where noise, weight and volume must be kept to a minimum low maintenance and for high reliability. He added: even more significant, however, is the rapid rate at which static inverters are being developed and improved.



Power inverter is described as an economical and efficient static system for changing d-c to a-c—particularly suited to the d-c from new power generating methods under development.

ECONOMIC OUTLOOK



by A. C. FARMER
Economic Consultant

Inflation Could Be Devastating

President Eisenhower is right when he says *inflation is our most* serious problem . . . Uncontrolled inflation seriously could weaken, if not destroy our entire defense program.

The basic cause of inflation* in the United States, both monetary and price, is the expanding private debt. At the end of World War II the total private debt was $139-billion, and at the end of 1959 was $529-billion.

In the same period, bank loans at the commercial banks increased from $26-billion to $112-billion.

In the postwar period, the increase in bank loans is the factor chiefly responsible for the increase in the bank deposits currency outside the banks, from $167-billion to $251-billion.

The greatest contributory factor to the expansion of bank loans has been the government housing program. In the postwar period, mortgages on non-farm properties increased from $18.6-billion to $131.2-billion, of which the government now has underwritten $53.9-billion. Other contributing factors have been the expansion of consumer credit, which has increased in the postwar period from $5.7-billion to $52-billion.

The Overall Effects of Inflation

Three serious developments are connected with monetary inflation when this monetary inflation is proceeding at a rate higher than the rate of increase of the production of goods and services. First, this results in price inflation, or a steady increase in the cost-of-living index; second, this results in an expansion of bank loans at a rate higher than the rate of increase in demand deposits; and third, this results in an expansion of private debt at a rate higher than the rate of increase in the volume of money in the economy. Eventually, as next discussed, this leads to an economic crisis.

The Ultimate Effect of Inflation

The ultimate effect of continued monetary inflation is an economic crisis.

Bank loans become excessive in relation to demand
deposits.

The private debt becomes excessive in relation t
the total volume of money in the economy.

Eventually the enforced liquidation of the accumulated debt leaves the government with the alternative
either of ruinous deflation or still further monetar
and price inflation. With the present trends, thi
crisis could develop in the next four or five years.

If any government of the United States is confronted in the future with the disaster that would follow
the enforced liquidation of an excessive volume o
private debt, it is questionable whether such a liquidation would be allowed to continue. Rather, it ca
be expected that enough money will be poured int
the banks to make it possible to slow up the liquidation and avoid general foreclosures. Such a polic
would, of course, result in monetary inflation to suc
a degree that thereafter the purchasing power of th
dollar would be most sharply reduced.

In estimating the ultimate damage to the econom
from continuous inflation, the following question i
pertinent. What is the basic difference in a nation before and after it has experienced a long and continuous inflation of prices?

As far as the national assets of the country are concerned, they would appear to be unchanged. Th
country still has the same manufacturing facilities
transportation facilities, electric utilities, communication facilities, and the same natural resources—th
same rivers and lakes and harbors, and the same mine
and forests. In other words, the physical assets al
appear to be unchanged.

One tremendous change, however, has taken place
Through inflation there has occurred an enormou
transfer of wealth. Everyone who had savings i
banks, everyone who had purchased bonds, everyone
who had purchased life insurance, everyone living o
pensions and annuities, had taken a tremendous loss
On the other hand, those whose savings and investments were in equities or in buildings or real estate
have had to some extent at least, their assets protected

Here then is an important reason why excessive
monetary inflation, leading to excessive price inflation
should, by all possible means, be resisted and prevented. No justification can exist for any policy, the
end result of which would destroy the savings of the
large group that chose to put their assets in fixed-income securities.

In conclusion, the suggestion that a modest degree
of inflation would stimulate the economy utterly i
unsound and without basis in fact. Such a program
eventually would be destructive to a sound economy

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*In its usual context, the word "inflation" means "price inflation," but "price inflation" is possible only if there is "monetary inflation." This will be noted from the following definitions.

Monetary inflation is the expansion of the volume of money, or purchasing power, in the economy.

Price inflation is the effect on prices of an expansion of the monetary supply at a rate which is greater than the rate of production of goods and services.

It is quite possible for a time to have monetary inflation without price inflation. This is what occurred, for example, in the 1920's.

INDUSTRY IN *live better electrically* CONFERENCE

Utilities Problems Great But Not Insurmountable Is Consensus Of Southwest Electric Conference Speakers

Never before has there been such echnological ferment as exists in he electric utility industry today. Nor have there ever been more formidable problems facing the indusry. And yet prospects are bright hat accomplishments in the next ew decades may far outshine all previous advances by this industry.

Such was the exhilarating and hallenging picture presented by hose who addressed the Southwest Electric Conference at its Mar. 27-29 meeting at the San Marcos Hotel n Chandler, Ariz.

Taking a long look ahead to the year 2000, Philip Sporn, president, American Electric Power Corp., ould see no basis for pessimism egarding the availability of energy ources at that far-off date. Total nergy use will grow to 2½ times resent use, he predicted, but elecricity consumption will grow much aster.

In the year 2000, Mr. Sporn preicted, generation of electricity from oal will be down to 30%; from etroleum, down to 31%; from gas, own to 16%; from hydro, down to %; and that nuclear generation ill approximate the remaining 1%. He stressed, however, that the gure of 21% for nuclear generation is based on the most optimistic assumptions and that it may be quite a bit lower.

Mr. Sporn looks for two trillion kwh electricity production in 1975 and six trillion in the year 2000; the latter to constitute 40% of all energy requirements for that year.

In his discussion of means now under development for direct conversion of heat energy to electric energy, Mr. Sporn expressed the opinion that the future for mass generation by either thermionic or thermo-electric devices is highly problematical. He views the fuel cell as limited to specialized uses.

Possibilities for new achievements in the field of magnetohydrodynamics are much more exciting, in Mr. Sporn's opinion. This approach offers the promise of great simplification and much higher efficiencies, he said.

All of the challenging developments envisaged for the industry can be realized, Mr. Sporn declared. But, he warned, these prospective advances are not inevitable but can only result from tremendous and dedicated efforts by the entire industry.

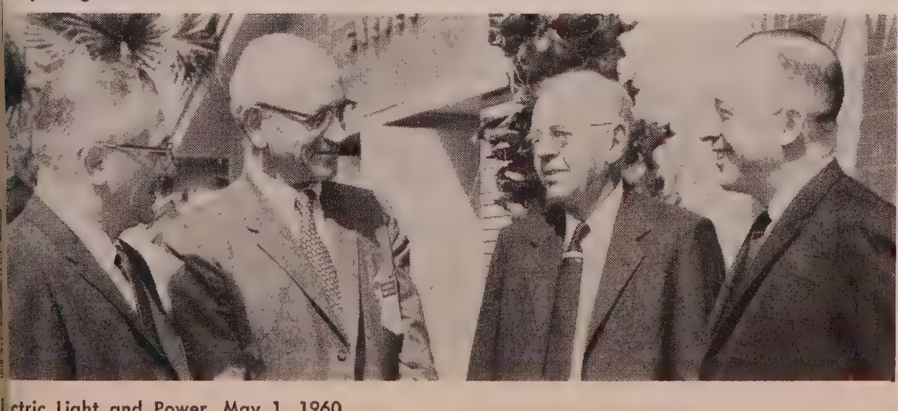
Our pell-mell advance as a nation will accelerate still further, declared Bryce N. Harlow, deputy assistant to President Eisenhower. To say that we are losing out to the U.S.S.R. in the electric-power field is much worse than just wrong, he warned, it is dangerously misleading. If electric power is to be an issue in the cold war then there is no question as to the outcome, he observed.

Problems and opportunities in Latin America were discussed by H. W. Balgooyen, executive vice-president, American and Foreign Power Company, Inc. "Latin America's ultra-nationalists, and the communists with whom they frequently make common cause, are doing a great disservice to the people of that region," he said, "by their unfounded charges of exhorbitant profits and heartless exploitation by foreign investors, which have led, in too many instances, to arbitrary government action and discriminatory legislation which, in the countries concerned, has effectively dried up the flow of foreign capital into productive enterprises.

"For Latin America as a whole, production of goods and services must increase at an annual rate of 2½% or more, or the standard of living of the people—already deplorably low in comparison with the United States and other industrial countries—must inevitably decline. This is a basic and ever-present fact of life for our Latin American friends, and for all who invest or do business in that area."

Speaking on the subject "The Investor Looks At The Electric Industry," Alfred L. Burke, executive vice-president, Duff and Phelps, Inc., expressed the opinion that there is no fundamental conflict in the long run in the utility field between what is good for consumers, what is good for employees, and what is good for investors. He observed that although he does not think present interest and preferred dividend rates are going to be a

eakers who addressed the opening session of the Southwest Electric Conference included to r) W. G. Scholl, executive vice-president, Allis-Chalmers Mfg. Co.; Philip Sporn, president, merican Electric Power Corp.; and Alfred L. Burke, executive vice-presdient, Duff and Phelps, c. At far right is Balfour S. Jeffrey, president, Kansas Power & Light Co., who presided at e opening session.



materially adverse factor in the utility picture, considerable ingenuity will be required by utility companies if they are going to finance at higher rates for senior capital and at the same time are going to do a good job for their common stockholders.

From an investor's standpoint, Mr. Burke said, "Is it unreasonable for him to ask that the utility industry be consistent in the accounting methods used when accelerated depreciation is taken? Without going into the question of which methods are best, the result is that both per share earnings of utility companies and their balance sheets are inconsistently stated. It seems to me that fairness to investors requires that the utility industry and the regulatory bodies get together and solve this problem."

Commenting on what investors expect of management, Mr. Burke said they expect management to do as well, insofar as earnings and dividends are concerned, as the conditions under which a particular utility company operates will permit. "This means aggressive load-building," he said, "rigid control over such costs as can be controlled; a realistic rate policy; good financing and, in my opinion at least, a realistic dividend policy."

J. L. Bates (far right), president, Central Power & Light Co., confers with the speakers wh addressed the session over which he presided. They are (l to r) Bryce N. Harlow, deput assistant to President Eisenhower; H. W. Balgooyen, executive vice-president, American an Foreign Power Co.; and Henry B. Hook, publisher, Davenport (Ia.) Morning Democrat.

In a discussion of the interrelations of the electric utility and manufacturing industry, W. G. Scholl, executive vice-president, Allis-Chalmers Mfg. Co., expressed confidence that the equipment manufacturers as a group will progress even faster in the period ahead than they have in the past. "As a group," he said, "we are spending five to seven cents of our sales dollar on research and product development.

"One of our major producers stated recently that it has one out of every eleven people working i various stages of research, development and engineering. In my ow Company's case, we have one out o nine engaged in this type of work.

"I believe research is inseparabl from manufacturing engineering They go together, and I believe thi is the best assurance of continue progress toward economical servic and a stable investment atmospher That is why we have vigorousl maintained a continuous program t reduce cost through design improvement on existing or soon to be available equipment."

EEI Sales Conferees Continue All-Out War Against Gas

Edison Electric Institute is continuing and stepping up its all-out war against gas competition in residential, industrial and commercial fields. Top sales executives representing most of the country's meters joined hands in the combat at EEI's 26th Annual Sales Conference in Chicago April 4-6.

In addition to receiving the latest information on how to keep the predicted sales curves headed upward, conferees were reminded several times throughout the meeting to keep their company's corporate image in a favorable state if it is there already, and to double efforts in bringing it out of the mire if it has sagged.

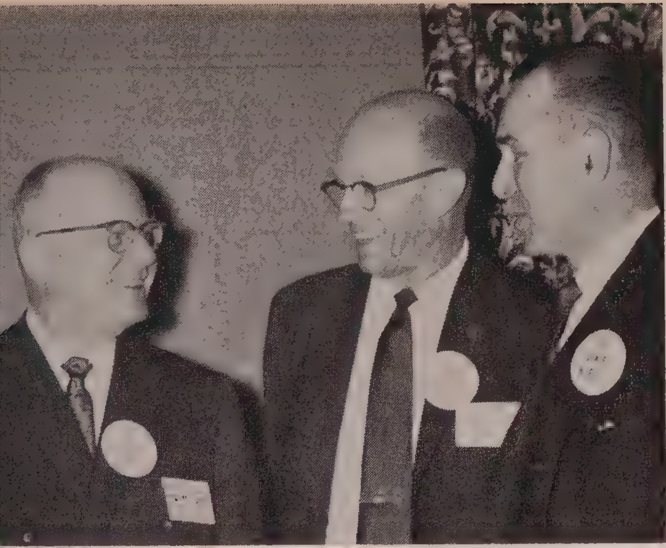
As EEI President Allen S. King put it, "All predictions will be true or untrue depending on what you do." He urged quick cancellation of any "inferiority complex" that might be in sales departments, and further stressed that sales executives should be way ahead of other company executives in thinking up new ideas, uses, etc.

How to *find* your company's corporate image through motivation research was described by Dr. Virginia Miles of McCann-Marshalk, Div. of McCann-Erickson, Inc. She noted an important gap: "The connection between the utility company and the appliances is generally not strong enough in the consumer's mind."

How to *build* corporate image and sales was described by G. C. Rawls, president, Louisiana Power & Light. Just ask yourself, he said, how do you rate (1) As an individual as part of your department; (2) Your department as part of your company; (3) Your company as a citizen. Individuals should be built up in personnel relations and instilled with a team concept where sales, engineering, and operating work together. The sales department should consider itself on a battlefield across-the-board, from handling irate customers well to givin special attention to influence-wielding people in communities. With th foregoing factors well developed the sales department should spar the corporate-image building activities among which are communit development programs, building o good will, etc.

Goal: A Flameless Residential Market

The Live Better Electrically concept is the most valuable tool th electric utility industry has today said Ralph Zeuthen, manager of th Live Better Electrically program "It is worth $-millions to us!" h said. Results of motivation researc have shown that the consume merely *expects* flame from gas, bu that the consumer looks on electricity and the elimination of the flam as an advantage and an improvement. "The housewife expects th future to be electric just becaus



All-out electric living is the answer, agree (l-r) EEI President, Allen S. King, Northern States Power; G. C. Rawls, Louisiana P&L and E. O. George, Detroit Edison.

she believes the flame is old fash-oned," he stated.

Summed up, the residential sales equation works out this way: Five words = $2-million. The five words: "You Live Better Electrically" and, "Flameless." Look for them in every residential loadbuilding ad.

Residential loadbuilders were given a refresher on activities of ommittees in the Residential Group, headed by R. G. MacDonald, West Penn Power. Activities were evealed in a clever mocked-up TV panel program which resembled "Meet the Press."

Residential Wiring Promotion: J. R. Furber, Northern States Power aid the need for an expandable wiring system in the home has been ecognized, and that Bill Milby of Detroit Edison is starting the ball olling with his Wiring Specifica-ions subcommittee. Initially, scope f needed research is being studied, efined and analyzed under EEI, ut manufacturers and other allies vill be asked *individually* to serve s group advisers.

Now available for a bargain $100 s the new Advanced Housepower 'orum ("Housepower Profit Clin-e") developed by the Sales Train-ng subcommittee under Jack Cath-rwood, Long Island Lighting. To elp contractors "sell-up" rewiring obs the Clinic offers five interest reas: (1) Tips on Business Man-gement. (2) Advertising and Sales romotion. (3) Personal Selling. 4) Selling "Plus" or "Profit Prod-cts." (5) Selling the Builder.

Residential Appliance Promotion:)ealer workshops are back on the ene, and will be called "Live Better Workshops," said E. J. Hurley, Detroit Edison. The workshop will cover all phases of the LBE program, which in turn means that the regional organization of the LBE Workshops should be composed of members of the five residential groups. This endeavor will be underway in the near future. Another committee, under C. A. Byron, will explore methods now in use or which could be developed to be useful in helping appliance dealers to become better business men.

Residential Space Heating: Headed by J. H. K. Shannahan, American Electric Power Service Corp., this committee, although organized late last year, already has subcommittees on sales training, sales promotion and industry relations. An EEI sales training course is in the works now for educating employees, contractors, builders and others. The committee is backing ESHAC in helping to publish a technical handbook for architects, engineers and the building trades. It should be ready in one year.

Because of its collection-point function, the committee has been largely instrumental in getting NEMA recommendations incorporated in the FHA Minimum Property Standards as the basis for electric acceptance. Latest advance is in respect to Section 714-e pertaining to insulation of living units and estimated annual kwh consumption for electric space heating.

Residential Lighting Promotion: Chairman J. R. Waters, Monongahela Power reported that Light for Living and Medallion Home programs are doing much to stimulate interest and sales in residential lighting. He stressed the importance of communications to distributors who must be kept up to date on national lighting promotions and local utility advertising and promotional plans.

When asked how a utility can promote Light for Living most effectively through its trade allies, Mr. Waters said, "The Academy of Lighting Arts has proved to be a most effective means. Graduates throughout the country include electrical contractors, distributors, interior designers, builders, architects and manufacturer's representatives.

The committee is planning programs which will (1) encourage selling of lighting by allies who have a profit at stake, as, for example, builders, fixture manufacturers, and their distributors; and (2) include lighting in a package of "other major loadbuilding items as, for example, Medallion Homes, or in the case of strictly electric companies, Total Electric Gold Medallion Homes.

Home Service Committee: Miss Judith O'Flaherty, Philadelphia Electric, reported that the emphasis by her committee has expanded from just the electric range, as a load builder, to the All-Electric Kitchen and Laundry. "This will expand to electric heating and cooking, as the policies of our individual companies dictate," she said.

She reported that a far more effective job could be done if the committee could do a little better on the budget appropriations.

Commercial Challenges

E. O. George, chairman, sales division executive committee, and vice-president, Detroit Edison outlined trends upon which EEI must set its sights. *Increasing:* (1) National food service chain organizations; (2) Number of universities and colleges that offer complete hotel management courses. *Decreasing:* numbers of restaurants per 1000 population (but size of and quality of individual restaurants are increasing). The larger installations lend themselves to automation, he said.

To handle these challenges, Mr. George suggested that a coordinated national program was needed to establish a central focal point as an "industry coordinating agency," national advertising and promotion, provide a national representative to call on national food chains, be able to call upon a distinguished individual to be present at national restaurant association meetings, and to improve overall communication. Most of these functions will be handled by the Electric Food Service Council which EEI will establish.

Joe B. Browder of Georgia Power described a wonder-working "gimmick" which is helping win an all-out war against commercial gas installations.

In the early thirties the company created a two-part rate for General Service Use. Part one was the usual rate structure utilizing the 30-minute integrated demand feature with the usual rate steps and a proviso that all energy in excess of 200 hours use of demand would be billed at 1¢ per kwh.

Part Two specifically encourages commercial electric cooking: "Any customer taking all of his service through on meter and who has not less than 40 percent of his total connected load in active *cooking* and *heating* equipment may at his option have his billing demand determined by load count rather than by measured demand." When a load count is physically made the rate stipulates that all heating, cooking, air conditioning and fan loads are omitted, and only 80 percent of the lighting and 50 percent miscellaneous motor load is counted for billing purposes. The minimum is $1.00 per month per kw of total connected load when the counted demand basis is used.

This rate, when applied to a large commercial customer on the *measured* demand basis will average not less than 1.25¢ per kwh.

"When our rate was written," he said, "the word *heating* meant, and was intended to mean, water heating — not space heating. We have interpreted this clause to suit modern day use, and now permit space heating to 'qualify' the customer for counted demand, *provided* he fully air conditions, electrically, the same area that he is electrically heating.

Thus, an *existing* customer being billed on the *measured* demand basis, who already has air conditioning, may install enough cooking and/or heating equipment to qualify for being billed by *counted* demand and his total electric bill may even *decrease*, or at most, go up very little."

"Meet the Pros," said West Penn Power's R. G. MacDonald (left) as he introduced (l-r) Union Electric's Merrill Skinner, Metropolitan Ed's T. O. McQuiston, O. R. Doerr, and J. R. Hartman, Cleveland Electric Illuminating.

The trick lies in having to have heating to get the rate and once you get it the other loads come lower costs also, he said.

"We must change from the old pattern of footcandles to the new pattern of using light as an important part of our total environment," said H. E. D'Andrade, General Electric Co. He suggested that instead of waiting for a slow process of education to go to work for the industry, "we should set to work and show architects good lighting systems that can be bought without difficulty."

"How? (1) Show the public good lighting systems on your own properties. (2) Invite engineers and architects to use these systems as demonstrations for their clients. (3) Encourage architects and engineers to relight their offices and conference rooms in accordance with modern standards. (4) Establish an advisory service for these allies. (5) Seek invitations to speak before their societies. (6) Invite them to IES meetings, and (7) Find a way to establish an annual award for the best lighted building or buildings of important types in your territory."

Excellent public relations through good streetlighting were reported by Albert V. Hartl, Otter Tail Power. In light of these "Street lighting, if properly approached, can help you better your public relations no matter what particular group of the public you might be considering," he said. He drew the following conclusions: (1) To maintain proper load growth in street lighting, sell between contract expiration periods — continue to sell more and better street lighting at all times, not merely be order takers from a council that has never been instructed in the potentialities for good of a streetlighting program.

"We must be aware that street lighting has values other than those related to the profit and loss statement," he said "We must bear in mind that a good street lighting system is our 'jewelry' that tells about us, not only at night but also in the daytime by its beauty and evidence of progress."

Industrial

What might seem to be a roadblock in selling higher illumination levels, namely fixture-generated heat—can actually be one of the greatest opportunities for kwh building, according to A. C. Barr, General Electric Co. "When we install 100 to 200 fc of illumination in buildings, we're also installing a source of heat with a potential of compensating for much of the building's heat losses in cold weather," he said.

He suggested that promoting lighting can be the best way to accomplish goals in electric heating. This may have two interesting consequences:

(1) With lighting furnishing the bulk of the heating needed, conventional electric heating may well become the most economical method of providing for the remaining heating requirements—or, heat pumps which may be judged uneconomical for use in certain latitudes today may become the best choice.

(2) On the other hand, if some customers find that the lighting they're installing is providing ⅔ to

(Continued on page 66)

Computer Study Proves Benefits Of Reduced Regulator Bandwidths

Recent computer studies by General Electric Co. show that reduced voltage-regulator bandwidths increase system earnings of electric utilities. According to Product Planner E. E. Wejman, Pittsfield, Mass., the studies demonstrate that now bandwidths as narrow as plus-or-minus ¾ v are considered practical from any standpoint—including that of equipment life.

While it was previously felt that the increased number of regulator operations resulting from a narrower bandwidth would mean vastly increased maintenance costs and shortened equipment life, Mr. Wejman stresses that, by analyzing actual (as opposed to theoretical) data, G.E. has demonstrated that this has not been the case.

Energizes Aluminum Tower Line

Philadelphia Electric recently energized an eight-tower section of the transmission line linking Chichester, Pa. with Eddystone station. The eight towers, part of a group of 20 designed and fabricated by Aluminum Co. of America for double-circuit 220-kv service, make up the first mile of the six-mile 132-kv line.

Once the 12 remaining towers are completed (mid-1960) the second circuit will link Philadelphia Electric with neighboring utilities to become part of a ten-million kw interconnection with Pennsylvania, Maryland and New Jersey.

On this line, aluminum towers were specified on a cost-saving basis. Their total service-life cost is expected to show savings over steel towers, reflecting lower erection expense and eliminating painting.

How To Stretch A Smokestack

A novel nozzle design has increased by 100 ft effective height of Pennsylvania Electric's 214-ft stack at Seward Generating Station. Since not enough time was available during normal shutdown to add a concrete extension, a ten-ton stainless-steel nozzle, by Aerotec Industries, Inc. was attached to the top of the existing chimney. With choked down stack diameter, exhaust gas velocity was increased, adding to effective stack height.

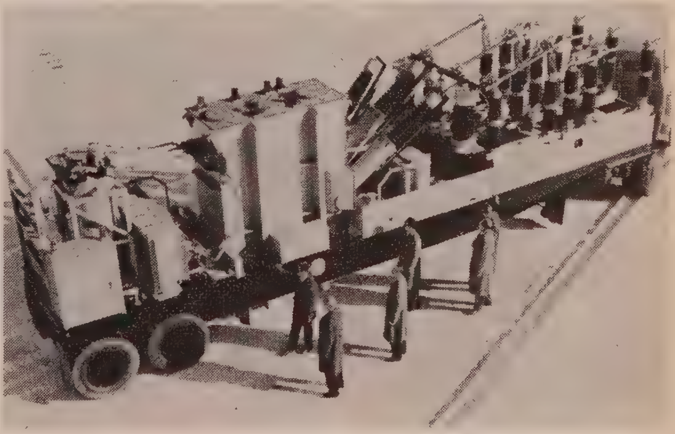
A double-shell skirt was used on the nozzle to connect it to the dual brick-concrete chimney construction. The 19-ft-OD outer concrete shell is separated from the inner brick lining by a six-in. air space, which allows the chimney's outer shell to sway under wind load while the inner brick lining remains relatively stationary.

The inner skirt was attached to the brick liner by a DuPont Teflon fiber impregnated with DuPont Viton synthetic rubber which resists 400F corrosive gases. The outer skirt was fastened to external supports on the concrete stack. Thus, total weight of the ten-ton nozzle was cantilevered from the load-bearing concrete.

With the new stack extension, it takes only an additional two in. fan pressure to shoot the 485,000 cfm of gas 100 ft or more above the chimney top.

Proposes National Engineering Academy

A National Academy of Engineering, on a par with the National Academy of Science, is proposed by General Electric's Dr. J. Herbert Holloman, head of the company's general engineering laboratory. With a National Engineering Council as its "right arm," the suggested Engineering Academy "would investigate, examine, experiment and report on any subject of engineering called for by any department of government."



Said to be the highest rated mobile substation ever built, this 115-kv, 17-mva unit was recently shipped to Public Service of New Mexico by General Electric. The complete mobile substation, without its tractor, is 42.5-ft long, 8-ft wide, 13.5-ft high and weighs 41 tons. Its three-phase, forced-oil-cooled transformer has dual high-voltage ratings of 46 and 115 kv which can be stepped down to 4160Y/2400, 12,470Y/7200 or 13,800Y/7979 v. The unit's rating is 17 mva at 65C rise—the equivalent of a 15-mva unit at 55C rise. Included are a high-voltage disconnect, fuses, lightning arresters, circuit breaker and complete relaying and control equipment. The company is prepared to furnish similar units which will be rated up to 20 mva, 115 kv.

WHY SYSTEM MEASUREMENT IS IMPORTANT

By P. C. O'SHEE
Superintendent of Distribution, Alabama Power Company

Power factor "Bird Dog" var meter helps Alabama Power Company get the most for its capacitor dollar. It not only "Bird Dogs" where additional capacitors are needed during peak loads but also where too many capacitors were installed on a "guess" basis for generating requirements before var meter was installed.

SINCE WORLD WAR II, the electric utilities have been confronted with a continual increase in reactive load being added to their systems resulting in poor power factor. This condition would seriously affect the capability of their equipment and their efficiency of operation if necessary corrective action was not taken. To combat this, they have had to adopt capacitor programs of installing sufficient capacitors each year to offset the reactive loads that have been added during the previous year.

Near Unity Power Factor

Since production operation costs are the most costly operating expense of a utility, it is essential that the maximum amount of saleable kilowatts be generated and this is primarily dependent upon the power factor being as near unity as is economically feasible. Also, costs of new generating facilities continue to rise, as has everything else, so it is mandatory that we secure the maximum economical capability from our existing generating facilities in order to limit the amount of our new generator facility requirements to the practical minimum. The importance of this is emphasized by the experience of the Alabama Power Company which adopted a capacitor program a number of years ago.

Our present net capability of all generating plants is 2,076,500 kw and our average power factor, based upon low voltage bus at our transmission substations at system peak in August 1959, was 93.7 percent. If we did not have any capacitors on our system, we estimate that the power factor would have been about 81 percent.

Location Is Important

Since capacitors have the characteristic of improving the power factor of all facilities from the point where they are installed all the way back to and including the generators, it is essential that we locate them as far as practical and economical from the generators in order to get the most for our capacitor dollar. The location of these capacitors is where the importance of system measurement raises its head. You cannot properly locate

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Editor's Note: This article is adapted from a paper presented at the Sangamo Workshop Seminar in Greenville, S. C., November 17-19, 1959.

hese capacitors to secure the maximum benefit for your capacitor dolar unless you know what the power factor is at your generating lants, your transmission substaions, your distribution substations nd on your distribution feeders. This power factor must not only be nown during the annual peak load ut for other periods of the year, ince a poor leading power factor is lso objectionable.

Graphic Meters

We, as engineers and operating nen, would like to have graphic neters at all the locations menioned above, including all major listribution feeders, but we, as pusiness men, realize that this vould not be economically feasible. Besides the installed cost of these nstruments, we would have the ost of the charts, changing the harts, reading the charts, compilng the data, testing and maintainng these instruments. Because of his, we can only justify permaently installed graphic meters at ur generating plants and transmision substations. This leaves our istribution substations and distriution feeders without instruments o tell us what our power factor ondition is at these locations. Of ourse, we can install portable raphic meters temporarily at these ocations but they would only tell s what the condition is during the ime of their installation and since ve are primarily interested in what he power factor condition is under eak load condition, we would have o purchase as many instruments as ve would need for permanent intallation to secure the full picture. lso, the cost of installing and reoving portable instruments must e considered.

Temporary Instruments

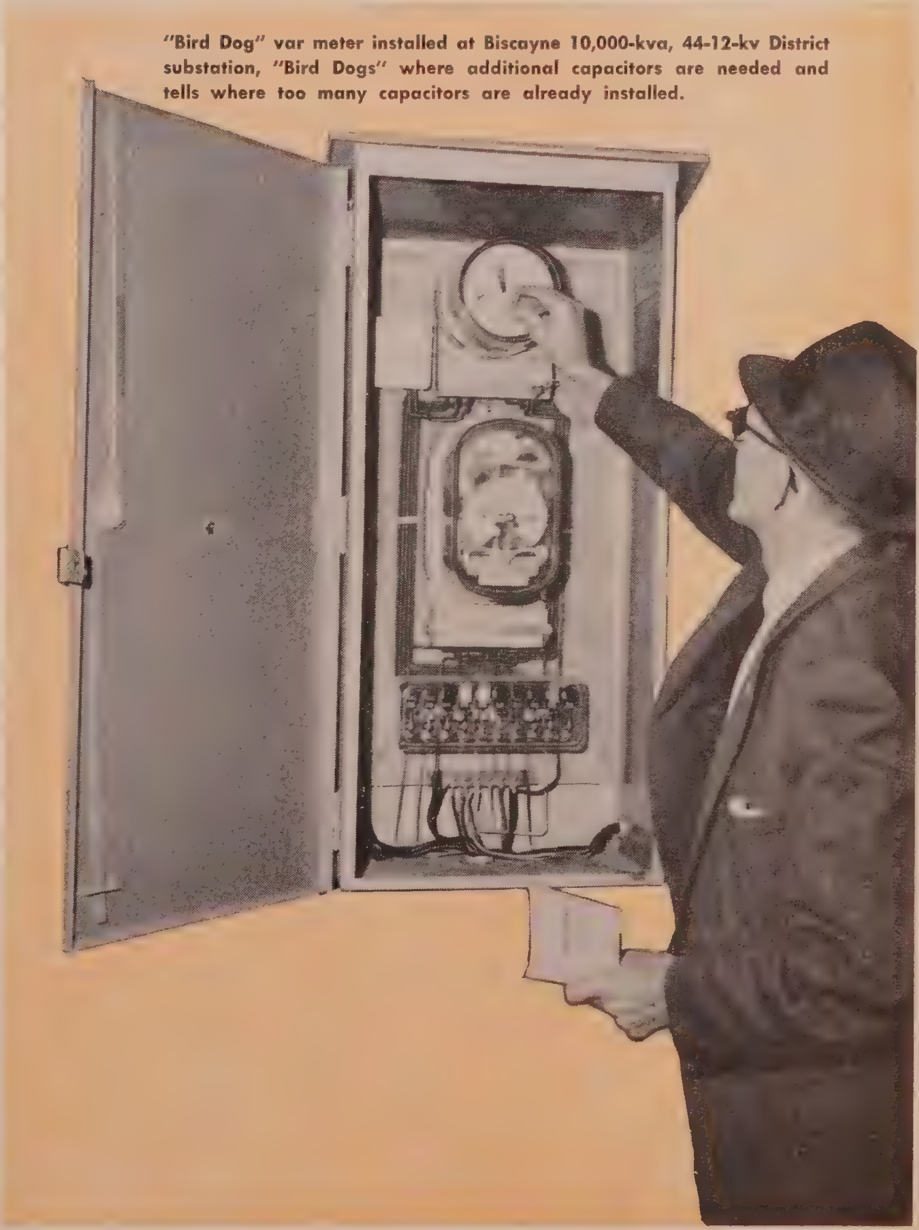
The above problem bothered us r a number of years since we had install capacitors each year for eneration to offset the reactive ad being added and we did not ave permanently installed instruents below our transmission subation level. We tried installing mporary instruments at a reprentative group of distribution subations during peak load condions but realized that this was not onclusive. The result was that capacitors were installed for generating plant requirements on the best engineering calculations that we could make but we realized that we were not getting the most out of our capacitor dollar.

"Bird Dog"

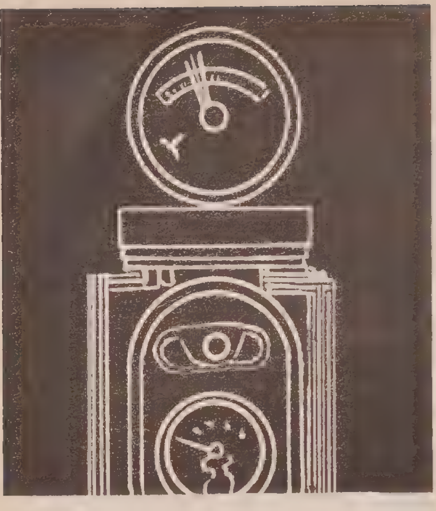
After considerable study, we arrived at the conclusion that what we needed, and could afford, was an economical indicating instrument that we could install at our distribution substations that would be a power factor "Bird Dog." That is, an indicating instrument that would give us the maximum and minimum lead and/or lag for each month of the year. With such an instrument, the substation meter reader could record the readings each month, and reset the hands on his monthly trip to read the distribution substation kwh and kw meters and record these readings on the same form on which he records his monthly kwh and kw meter readings.

With this data, the clerk that compiles the monthly distribution substation kwh and kw report could record this data on this report. A copy of this monthly report is distributed to our General Office Distribution, Transmission and Engineering Departments as well as to our Operating Division and District Offices. The engineers in these departments and offices could then determine from these reports the substation having a bad power factor condition, either leading or lagging, during any month of the year.

With this "Bird Dog" instrument



"Bird Dog" var meter installed at Biscayne 10,000-kva, 44-12-kv District substation, "Bird Dogs" where additional capacitors are needed and tells where too many capacitors are already installed.



	End of 1959 (Kvar)	1960 Program (Kvar)
Distribution lines—unswitched	180,551	4,650
Distribution substations—switched	174,950	8,400
Transmission substations—switched	97,550	5,400
Transmission lines—switched	—	13,200
Total kvar	452,655	31,650

pointing out the distribution substations having bad power factor conditions, you, of course, reduce the number of distribution substations and distribution feeders that you have to check with graphic meters, if necessary, to get the most for your capacitor dollar. This instrument not only "Bird Dogs" where additional capacitors are needed during the peak load, but also where you may have already installed too many capacitors on a guess basis for generating requirements before you had the instrument. In addition, it "Bird Dogs" locations where you should switch capacitors off the line during periods other than the annual peak period in order to keep the power factor as near unity as practical.

The "Bird Dog" instrument that we adopted in 1958 is a "Var" indicating meter developed by the Sangamo Electric Co. We decided that we would install them at our distribution substations over a period of several years. Reason for this program was to secure operating experience before we expended a large sum of money and, of course, to spread out the cash requirements to purchase and install them.

Three-Part Program

The program adopted was, in general, divided into 3 parts:

1. Install these instruments at distribution substations in areas where it was known that capacitors would be required for generation in the foreseeable future and where there were few, if any capacitors in the substations or on the distribution feeders served by them.

By doing this first, we assured ourselves that the capacitor dollars we knew we would have to spend would be spent wisely. This was possible because with the factual data secured, we would know how many capacitors could be installed in these distribution substations and on the distribution lines served from them that would be of the greatest benefit to distribution and transmission as well as to generation.

2. Install these instruments at distribution substations in areas where it was known that capacitors would be required for generation in the foreseeable future, and where there were capacitors already installed in these substations and on the distribution feeders served by them.

These installations would enable us to determine how many additional capacitors we could install in these distribution substations and on the distribution feeders served by them to the advantage of distribution and transmission as well as to generation. Here again we assure ourselves of getting the most for our capacitor dollar.

3. Install these instruments at the remaining distribution substations on the basis of kinds of load served by them and the capacity of the substations until meters had been installed in all substations and the program was completed.

Reasonable Cost

At the present time, we have 575 distribution substations and have installed a "Bird Dog" var meter at 122 of these substations. These substations do not include substations that only serve one customer, as our terminology for this type of substation is "Customer Substation." The average installed cost of the "Bird Dog" var meter is about $150 which we consider reasonable and an amount that we can easily afford to spend for the value we receive.

Number and locations of capacitors on our system are shown in the table above. Those who are familiar with costs per kvar installed realize from the above the investment we have in capacitors and why it is so important that we be sure that we get the most for our capacitor dollar.

Policy

The above tabulation points out the fact that our policy to date has been to install switched capacitors at substations and unswitched capacitors on our distribution lines. I, as a distribution man, hope that we can continue this policy and still keep our power factor as close to unity as is economically sound. We must consider all factors before we make a decision or we will find that our decision will be advantageous from one viewpoint but very objectionable, and possibly hazardous, from another viewpoint. The policy we have followed to date enables us to:

1. Install capacitor banks on distribution lines up to 300 kvar using standard cutouts and fuses that will protect the system from the capacitor bank but still coordinate with the substation breaker.

2. Install the required kvar on the distribution feeders, in 300 kvar units, at locations where they will be most advantageous.

3. Locate these capacitor banks on poles where they will not be in the way, or rob space, required for distribution transformers, feeders, street lighting circuits and fixtures, secondary or foreign attachments such as telephone cables and open wires, traffic signal circuits, fire alarm circuits, telegraph circuits, etc.

4. Reduce the possibility of flashover when line switching is being done on the distribution feeders. This is a hazard to our men that we must seriously consider in our decision.

5. Eliminate the objectionable abrupt change in voltage that occurs when large banks of switched capacitors on distribution feeders are switched on or off. This is very objectionable to our customers and may result in failure of their electrical equipment for which we may have to pay.

6. Eliminate the cost of periodically inspecting and maintaining the switching equipment that would be required if we installed switched capacitors on distribution lines.

Additional Advantage

The above discussion of our policy on installation of capacitors on distribution systems may give the impression that I have strayed from my subject. I have, to a certain extent, but if what I believe we will find from the "Bird Dog" var meter is true, it will have an additional advantage in helping us get the most for our capacitor dollar.

I believe you will agree that the majority of the reactive loads that confront us are seasonal loads rather than loads that stay on the entire year or loads that are on one day and off the next. If this is the case, we must vary the amount of kvar in our system to combat the varying reactive or we will not operate as efficiently as possible. I believe the "Bird Dog" var meter will tell us at what time after the annual peak we should reduce the number of unswitched capacitors on the distribution lines and at what time before the next annual peak we should put them back on the line.

Graphic Meter Test

This belief is based upon a test we made with graphic meters at a summer peak distribution substation which had unswitched capacitors on the distribution feeders served by it. The test showed that we had leading power factor from about November to May and lagging power factor during the remaining months. The "Bird Dog" var meters will tell us if this condition exists on our other distribution systems and if so, it should be more economical to switch capacitor banks on distribution lines on and off by hand, twice a year, by merely opening and closing the cutouts, than to pay the carrying charges on the switching equipment and the costs of inspection and maintenance of this equipment. We must remember that our linemen are not expert instrument men and that you cannot get an expert instrument man up the pole.

Manufacturers

We in the utility business are fortunate to have expert instrument manufacturers, who realize the problems that confront us and spend their time and money on research. They realize that we are continually confronted with new problems and at times the instruments available on the market will not take care of our new problem or are too costly for the application we wish to make of them. In these cases, they develop what we need and can afford. The "Bird Dog" var meter is one example of this and the maximum-minimum socket type indicating voltmeter is another.

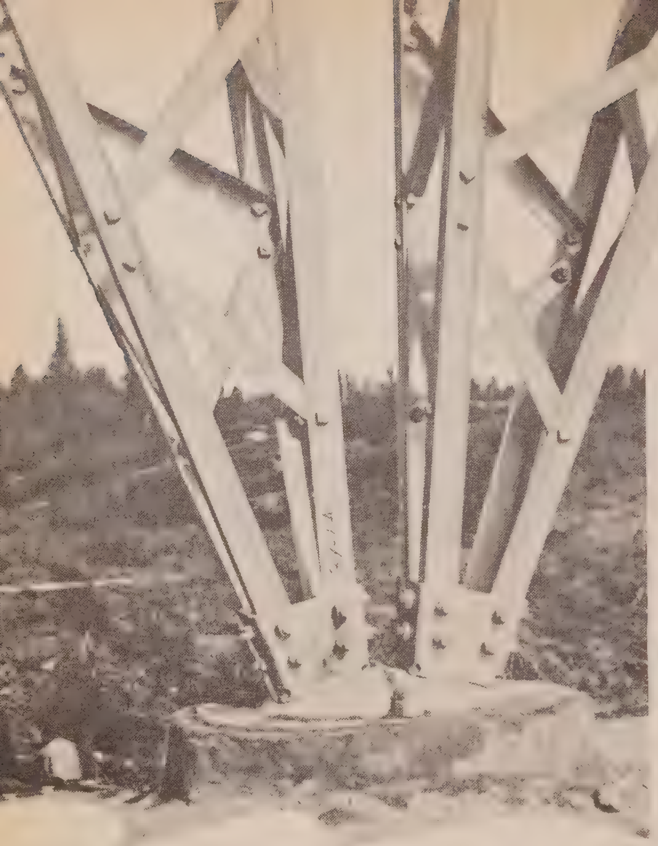
Monthly distribution substation kwh and kw report. Note the kvar readings (on the right side) obtained from the "Bird Dog" var meter.

BIRMINGHAM DIVISION

Aug., 1959 Page No. 4

	KWH X 1000		KW		Transf. Capacity	Substa. Capacitors		KVAR			
						Metered	Unmetered	1958		1959	
Suburban District	1958	1959	1958	1959	KVA	KVAR	KVAR	Max.	Min.	Max.	Min.
Birmingport Cent.	113	68	348	348	750(1)	......	.....				
Howard College Cent. No. 1	659	707	1584	2016	2,000	......	....	288	†36	360	†72
Howard College Cent. No. 2	497	664	1116	1380	3,000	......	.....	396	0	840	†480
Kimberly Cent.	124	125	420	420	1,250(1)		......	......	......	......	......
Leeds Cent.	887	806	1854	1836	2,000	450	......	......	......	......	......
Mountain Brook Cent.	414	646	900	1458*	2,000	......				......	...
Oak Grove Cent.	1104	1212	2664	3240	3,750	......	450	648	†504	864	†288
Trafford Cent.	134	151	424	432	750	......	......	......	......	......	......
Valley View 4 kv	691	700	1656	1800	2,000	......	......	......	......	......	......
Total 2.4/4 kv	4623	5079	10966	12930	17,500						
12 kv Substations											
Adamsville Dist.	499	1058	2340	2592	3,750	450	......	......	......	576	†360
Apex Dist.	812	893	1701	1836	3,750(1)	1050	......	......	......	......	......
Birmingport Dist.	224	270	637	605	750(1)	......	......	......	......		
Biscayne Dist.	1291	1685	3276	4320	10,000	600	......	.....	....	†1512	1080
Bluff Park Dist. No. 1	583	1450	1428	3528	3,750	......	......	360	†144	1080	†216
Bluff Park Dist. No. 2	816	739	1980	1827	2,000	......	......	†288	108	684	252
Cahaba Hgts. Dist.	1126	1291	2520	3132	3,750	......	....	......	......	......	......
Cardiff Dist.	475	475	972	1050	2,000		300	......	......	......	......
Concord Dist. No. 1 and No. 2	498	513	1080	1161	2,000	500	......	......	......	......	......
Docena Dist.	1462	1015	3240	2412	3,750	900	......	......	......	......	......
Fulton Springs Dist.	1070	946	1974	2184	3,750	450	......	......	......	....	.....
Gardendale Dist. No. 1	348	638	756	1368	2,000	300	......	......	......	216	†144
Gardendale Dist. No. 2	288	317	432	702	1,000	.....	......	.....	....	135	†27
Hueytown Dist.	1236	756	2772	2952	3,750	450	......	576	0	576	†144
Huffman Dist.	1327	1181	2982	2982	3,750	600	......	......	......	......	......
Johns Dist.	179	176	416	432	750(1)	......	......	....	..	....	......
Ketona Dist.	2002	2098	4680	4896	7,500		......	2160	†288	2304	†144
Lee's Jct. Dist.	848	1272	1584	2736	7,500	450	......	......	......	†432	0
Leeds Primary	444	587	924	1512	2,000	600	......	.....	......	......	......
Mobile Jct. Dist.	1114	1104	2290	2376	3,750	450	......	†432	288	†1368	360
Moody's Cross Rds.	565	702	1269	1539	2,500		......	......	......	......	......
Morris Dist.	348	350	891	891	1,250(1)	450	......	......	......		
Mt. Pinson Dist.	1046	1565	2052	3384	7,500	......	......	......	......	1296	†432
Mt. Site Dist. No. 1	611	..	1512	......	2,000	......	......	......	......	......	......
Mt. Site Dist. No. 2		886	.....	2160	2,000	......	......	......	......	......	......
No. Graysville Dist.	536	536	1269	1269	2,500	......	......	......	......	......	......

† Leading KVAR Capacitors on Distribution Lines not shown as all of them are metered.



Detail of "V" tower footing.

"V"-TOWERS CARRY MILLION HP THROUGH CANADIAN WILDS

By Hugh A. Jarman, M.S.A.E.
Montreal, Canada

Prefabricated aluminum towers designed by Alcan engineers fulfill objectives of light weight, economical air transportation to remote sites, quick installation with minimum equipment and crews, and reduced maintenance.

CONFRONTED with the problem of designing a 345-kv transmission tower to meet the stringent requirements of Canadian terrain and weather, be easily transported and erected, and require a minimum of maintenance, the engineering staff of The Aluminum Company of Canada Limited came up with an aluminum tower of somewhat radical design, but one which fulfills objectives and offers several economies as well. It is to be standard tower equipment on all Alcan transmission lines including the 90-mile line connecting the new 1,000,000-hp Chute-des-Passes hydro-electric installation with the company's other power plants.

Design Requirements

Since the new towers were to be installed in remote and hard-to-get-to places, bull-dozing a road through bush and swamp was out of the question because of costs. Towers had to be light enough to be flown to installation sites by helicopter, completely assembled in some cases.

Prefabrication was indicated because of the difficulty of getting heavy erection equipment into the field and because quick erection by a minimum-size crew was economically desirable.

A departure from conventional rigid-tower foundation design, requiring precision setting of four footings, was also indicated because of the rough and widely varying terrain.

"V"-Tower Selected

Alcan engineers finally decided upon a "V"-Tower design of all-aluminum prefabricated construction to best meet requirements. Components of the tower, with exception of guy wires and anchors, are made of extruded Alcan-B51ST6 with a total weight of about 2400 lbs. In addition to standard angles, two special shapes are used throughout the tower; these are a bulb angle for the legs, and a lipped channel for the crossarm's lower cords. These provide maximum strength and rigidity with minimum weight.

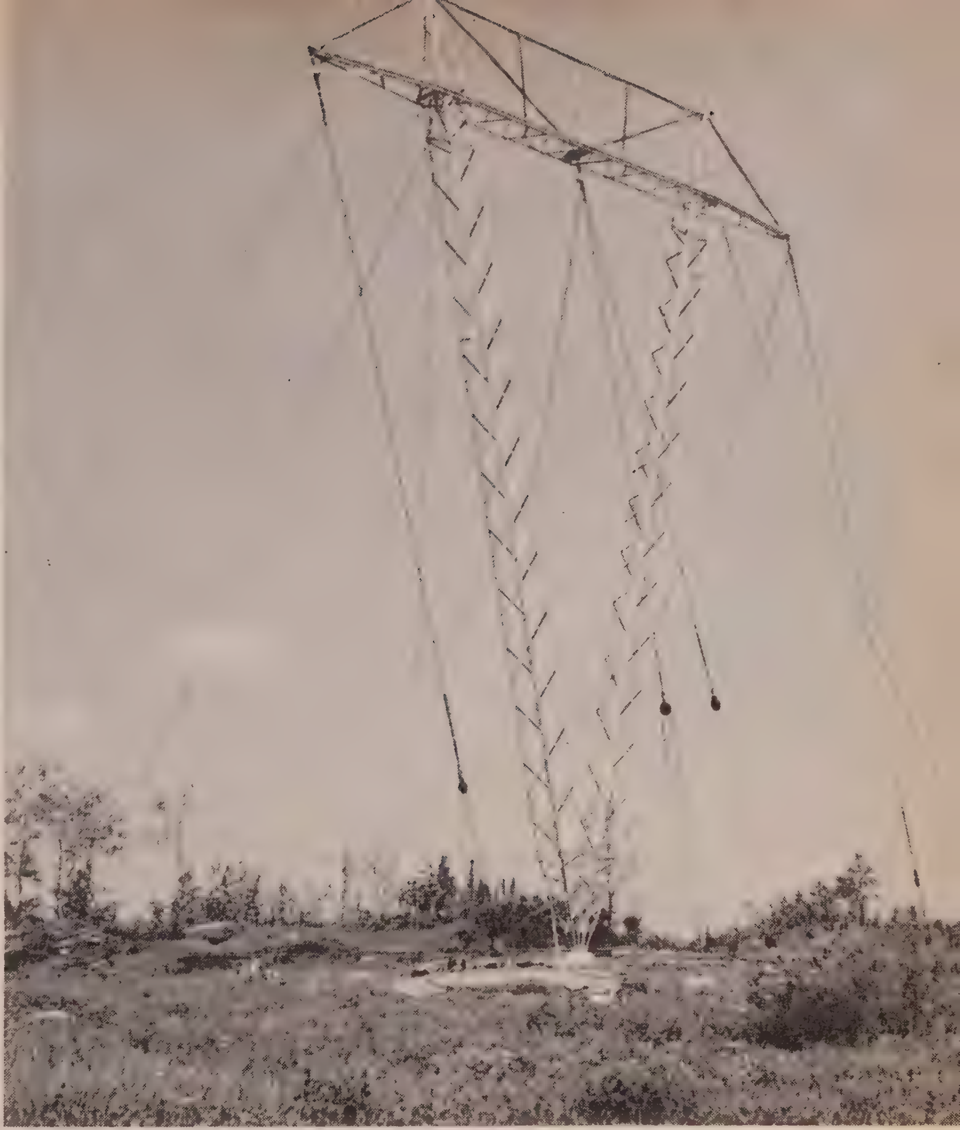
Before making any permanent installations on their own new transmission lines, engineers carried out extensive full scale tests. Various combinations of loads up to 22,000 lbs were applied at each of the three suspension points. A few minor design changes were made as a result of the tests. All of these were made to further decrease weight and to improve fabrication and erection procedures. Principle construction change was to include a pin hinge at the connection of legs to crossarm.

Following verification of theoretical design calculations four towers were erected under actual operating conditions. In practice, one erection crew, using very light pole equipment, repeatedly raised a test tower in seven minutes from a prefabricated position on the ground. The structure is about one-third the weight of a steel structure of the same or similar design.

Depending upon height required, six to ten sections 21-ft long are required for each tower. These are readily handled by two men whereas their steel counterparts would require either additional lifting equipment or use of more and shorter components.

The guyed tower principle in itself offers a marked saving in material over the rigid type. Use o aluminum has improved this advantage. While the guyed towers require five footings, four of these

Completed "V" tower requires only one set foundation footing, other four footings being inexpensive guy anchorages which can be placed without any extreme accuracy.

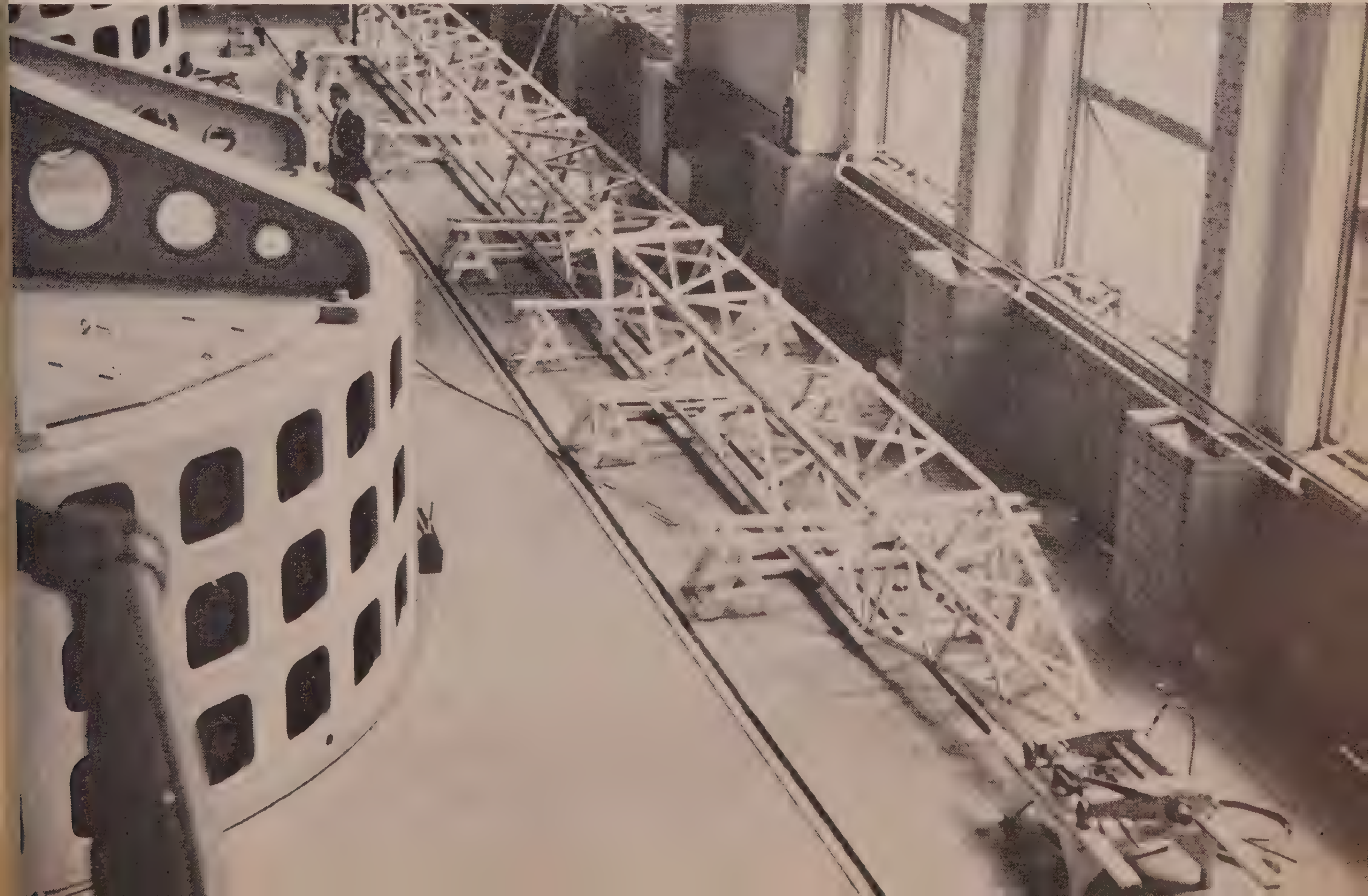


are relatively simple and inexpensive guy anchorages, and no great accuracy is required in placing them. While this concept is not new, varied designs having been used in many parts of the world and established as a standard in Finland, application of aluminum and arrangement of components are unique.

Alcan Conclusions

After extensive studies Alcan engineers are convinced that all-aluminum guyed towers will win wide acceptance and that extruded aluminum, particularly, can be advantageously used for this purpose. Benefits of prefabrication, light weight, air-right transportation to hard-to-get-to sites, simplified erection with light equipment and small crews, and promise of reduced maintenance have led the company to a program of full-scale production, not only to meet its own needs but to make the towers available to others as well.

Prefabricated and assembled aluminum tower leg is transported by helicopter to erection site where it is quickly joined to other components; completed tower is erected with minimum equipment and crew.



SIMULATED RESERVE MARGINS SHOW GENERATION CAPACITY NEEDS

Simulation studies of future generation margin can foretell when a generator unit is needed an odds on the consequences of not having it b that date. Simulated reserve margins give better picture of risk than percent margin alon because they recognize dispersion of actual experience about average values.

By

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GENERATOR-CAPACITY needs are affected by unusual events as well as by average occurances. Each day on a power system is different from every other day. Loads are high or low depending on number of units installed, maintenance programs, and forced outages.

Each day's peak load is exceeded to a greater or lesser extent by "available margin" of capacity. This margin includes spinning reserve, units available but not running, and an allowance for capacity that could be supplied by interconnections if needed.

Simulation techniques, described in an earlier article[1], make possible representation of available margin on a day-by-day basis, using mathematical models of capacity and load.

Details of the generating-capacity model are subject of a recent article[2]. Both chance events and human decisions are simulated day-by-day for each individual generating unit. The model includes logic for forced outages, complete or partial, on-peak or off-peak, postponable or not. The model also includes scheduled outage logic which revises simulated maintenance schedules from week to week after considering probable loads during the next few weeks, desired maintenance work, and the short-rang capacity situation.

The load model handles dail peak loads as stochastic variable normally distributed, having different means and standard deviation in different months. Studies sho this behavior characteristic of load both for the Public Service syster and for its interconnected neighbors. Based on such studies, it i entirely practicable to make forecasts of future monthly averag loads and of dispersions of actua daily loads about the monthly average. The dispersions are differen in different months, being higher i months when temperature-sensitiv loads are important.

Operational gaming makes possible comparison of a simulate daily load with a simulated dail available capacity to determin simulated margin each day. Thi simulated margin has importan properties.

Use Of Daily Margin

The per-unit margin is

$$M = 1 - \frac{L}{C_{inst.} - C_{out.}}$$

where M is the available margin i per unit, L the daily peak load i mw, $C_{inst.}$ the installed capacity i

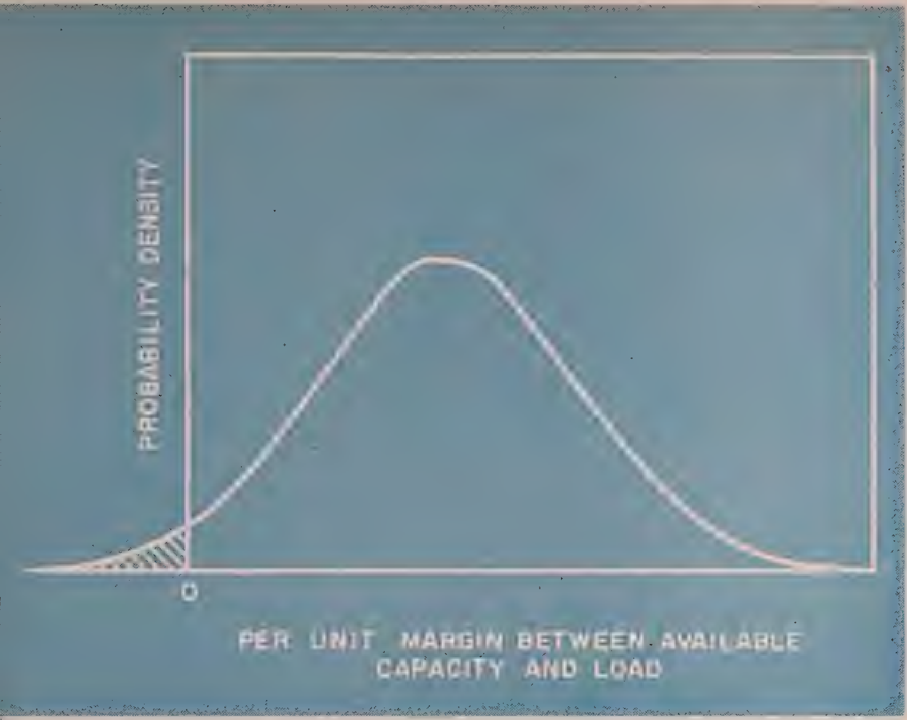


Fig. 1. Probability density function of daily available margin in generation capacity in a given month.

nw, and $C_{out.}$ the capacity on out-ge in mw. The probability density unction of this margin plotted for particular month has the general hape of Fig. 1. The density func-ion is a plot of the number of days ach month that per-unit margin as the specified values. Since eek-end days need not be considered in studies of installed capac-y requirements, Fig. 1 is plotted rom week-day margins only.

A negative margin means that oad exceeds capacity. Negative argin indicates, of course, loss of oad (except momentarily) on a eal power system, since maximum ssistance from interconnections as already been included in capac-y. The shaded area of Fig. 1 corre-ponds to the probability of having loss of load on any day during he month. Portion of the curve to he left of zero is an extension ased on known properties of the ortion to the right.

Figs. 2(a), (b), and (c) show istograms of available margins for hree future months: 2(a) during he heating season, 2(b) during ild weather, and 2(c) during the ooling season. Each month was mulated ten times, with different ossible combinations of capaci-es and loads as determined by in-ermingled probabilistic and deter-inistic events. About 210 different argins form the histogram for one onth. Heavy curves show normal, r gaussian, distribution curves fitted to the histograms. Statistical tests indicate a good fit in these and other months. This important conclusion greatly simplifies analysis of results, since a gaussian curve is specified completely by its mean $\bar{x}$ and its standard deviation σ.

The ratio $\bar{x}/\sigma$ gives the distance from the mean to zero margin in terms of number of standard deviations. In Fig. 2(a), $\bar{x}$ is 10.14% and σ is 2.79%. The ratio $\bar{x}/\sigma$ is 3.63, meaning that the mean is 3.63 standard deviations from zero.

It is easy to calculate the area under the curve to the left of zero. Statistics references commonly contain tables giving the area under a gaussian curve between the mean and points separated from the mean by a distance t. If t is identified as $\bar{x}/\sigma$, the area given in the tabulation is the area between zero and the mean.

Since the total area under one-half of a gaussian curve is 0.5, subtracting the tabulated value of area for a particular t from 0.5 gives the area to the left of zero. This area, 0.00014 in Fig. 2(a), is the probability of shortage on a specific week day in the month of January. If there are 21 week days in January, the probability of shortage some time during the month is approximately

$$1 - (1 - 0.00014)^{21} = 0.0029$$

or an equivalent risk of one day in

$$\frac{1}{12 \times 0.0029} = 28.8 \text{ years.}$$

Fig. 2 shows greater dispersion of margins in January and June, as might be expected from the greater variability of load in these months. Fig. 2 also shows that percent margin alone is not a reliable index of the adequacy of installed reserve. The fact that margin is higher in June than January is much more than offset by the higher standard deviation in June. In January $\bar{x}/\sigma$ is 3.63 and daily risk is 0.00014; in June $\bar{x}/\sigma$ is 2.66 and daily risk is 0.0039, 28 times the January figure!

Note that monthly $\bar{x}/\sigma$ is itself an excellent measure of risk. No further calculation need be made once familiarity with this concept is achieved. The changes in the ratio from month to month indicate the changing risk.

Variation Of Margin With Time

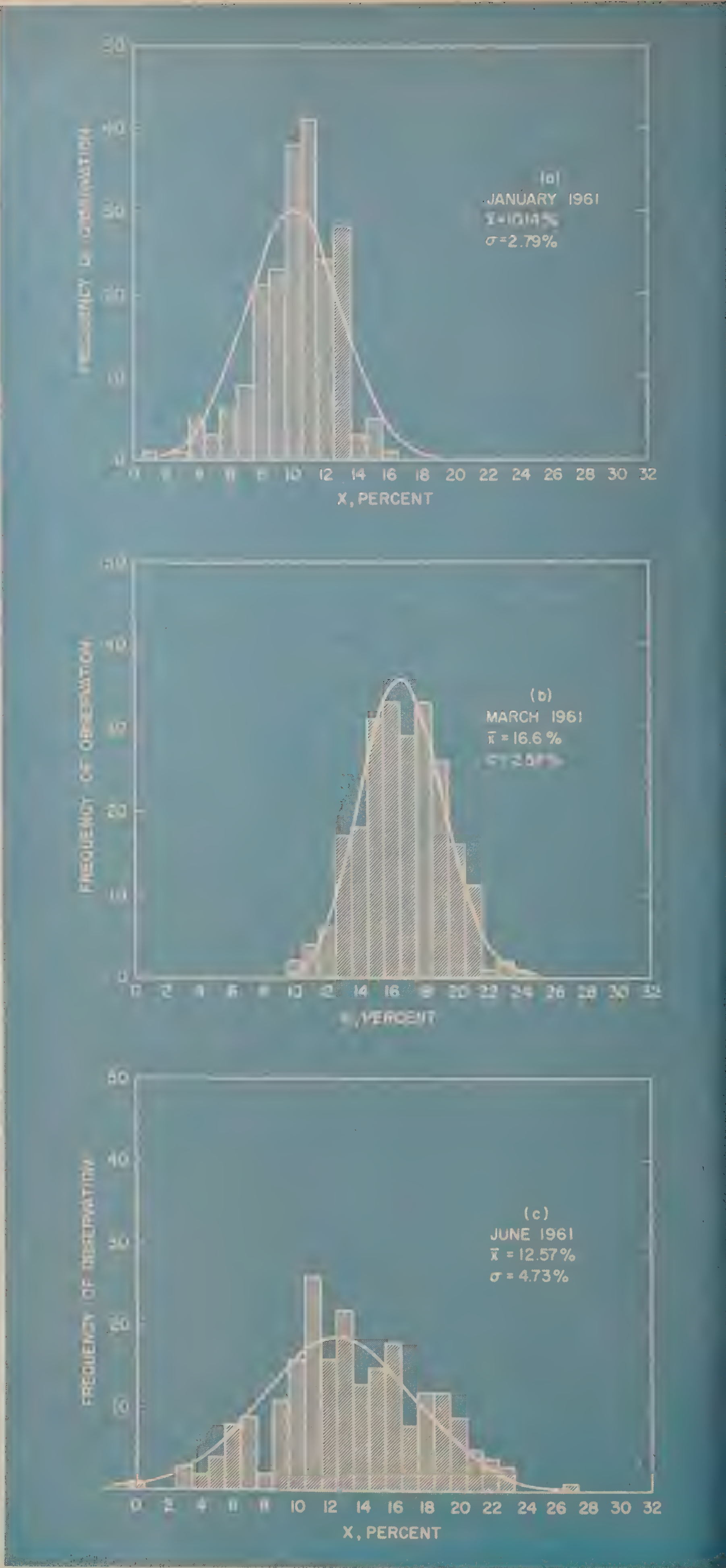
A single month's margin experience is enough to calculate an estimate of $\bar{x}$ and σ, and hence t. The solid line of Fig. 3 connects the monthly values of t for two years of a particular game, with simulated time beginning in January, 1960. No new generators are added. The general trend of t is down, since risk is increasing as a result of load growth without any increase in capacity. Values of t tend to be considerably lower than the trend during the summer. This is explained by higher values of σ during the cooling season with its temperature-sensitive loads. The t values are also somewhat lower during the winter, except in December when the capacity model

Table I

Lowest value of simulated generation reserve margin during summer of 1964 without unit Y

Game	Minimum $t = \bar{x}/\sigma$ Experienced in 1964
1	3.6
2	3.1
3	3.1
4	3.5
5	3.1
6	3.2
7	2.9
8	2.9
9	4.1
10	4.1

Fig. 2. Histograms and fitted density functions of daily available margins from ten games; (a) January; (b) March; and (c) June.



enforced a rigid no-maintenance rule.

Fig. 3 has horizontal lines plotted at $t = 3.95$, 3.35, and 2.66, which correspond to risks of once in 100, 10, and 1 years respectively. Previous probability approaches to installed reserve requirements have used risks within this range.

The dotted lines in Fig. 3 show highest and lowest values of t in each month of two years for ten games played on the model. All of the ten games played lie between these upper and lower limits and and average lies somewhere in between.

Service Dates Based On Odds

The simulated margin data of Fig. 3 suggests a new approach to service dates, one based on odds. This would state for example, "Unless unit Y is in service before June, 1964, there are about two chances out of ten that conditions will be worse than experienced during the summer of 1957, and about 8 chances out of ten that it will be worse in the summer of 1958." Historical references are to periods when margins were relatively low, and when operating consequence of that situation are known.

Analysis of t values for past Public Service experience shows a general relationship between t and operating experience, with low values of t corresponding to periods of relatively difficult operating conditions. The practical significance of t can be established for a particular system by studying past experience. Comparisons between simulated t in a future month and actual t in

Table II

Service-level odds for 1963-65 with no new units

Future Years	Risk Worse Than 1957 (When t was 3.0)	 1958 (When t was 4.0)
1953	0/10	2/10
1964	2/10	8/10
1965	9/10	10/10

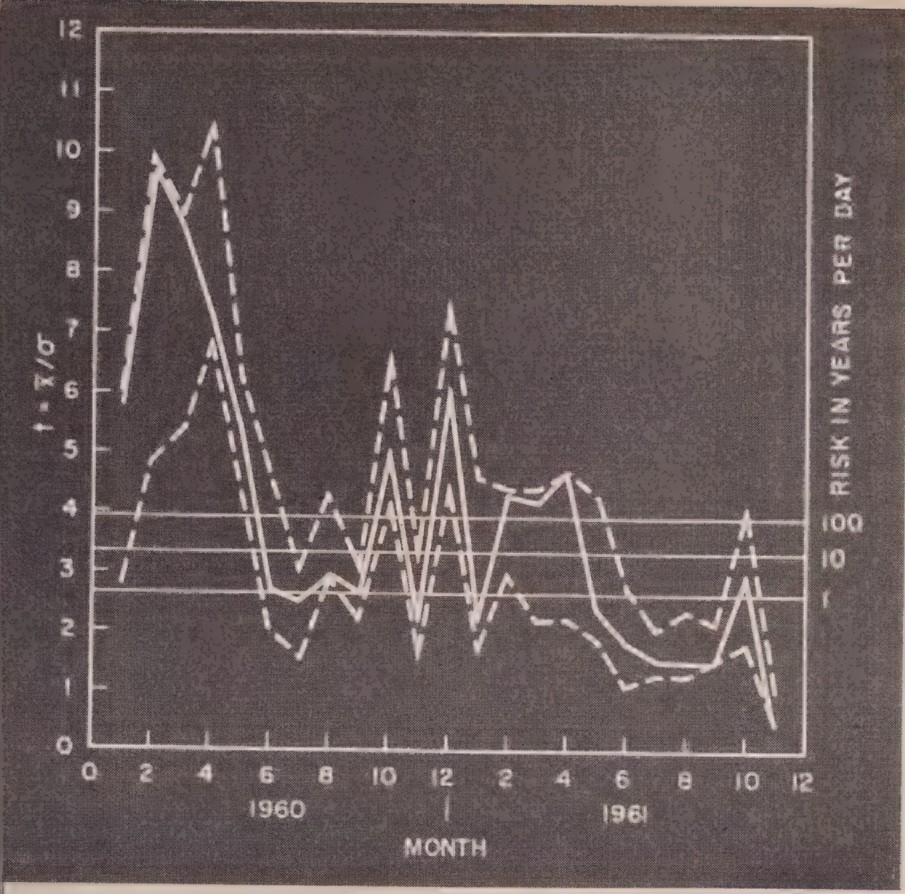


Fig. 3. Deteriorating risk over a two-year period with no generator-unit additions. Solid line gives results of one game and dashed lines give maximum and minimum values from ten games.

ome notable past month suggest he probable level of service to be nticipated.

Mechanics for establishing the ggested rule are simple. Assume r example that during the sum-er of 1957 t went as low as 3.0 and uring the summer of 1958 as low s 4.0. Next simulate the 1963-65 eriod a number of times, say ten, sing expected loads and capacities ut without unit Y. Estimated sta-stical properties of the many vari-ble quantities are included.

Each simulation or game employs fferent random numbers in the robabilistic parts of the model. eterministic parts of the model act consistently to whatever situa-ons confront them, in accordance ith the built-in logic. The 1964 sults of the ten games may look mething like Table I. In two out the ten games t is below 3.0; in ght out of the ten, below 4.0. This ta would support the conclusion ven in the example. Table II uotes the odds for all three years, 63-65. Management can use in-rmation such as this to decide hether or not unit Y should be heduled for service and installed fore the summer of 1964.

After deciding when to install unit Y, management can use the simulation process to tell when unit Y + 1 will be required and hence how long Y's capacity increment will suffice. This process consists simply of adding unit Y in the capacity arrays with the anticipated service date and letting the simulation proceed through 1964, 65, etc., until t values below the threshold again begin to appear.

A natural question is, "How many games must be played before reliable odds can be quoted?" The answer is found by playing more games and comparing results. Table III shows results of a second ten games and suggests that the first ten are adequate.

Thus, the tool can tell not only the "when" but the "how long" of a proposed unit. Such information is of particular value in comparing economics of alternative unlike-size units. Finally, the way is now clear to use simulated margins in studies of longer periods to fix service dates of each new generator on a consistent basis. In this way meaningful economic comparisons of complex alternatives are possible.

Table III

Table II Repeated For A Second 10 Games

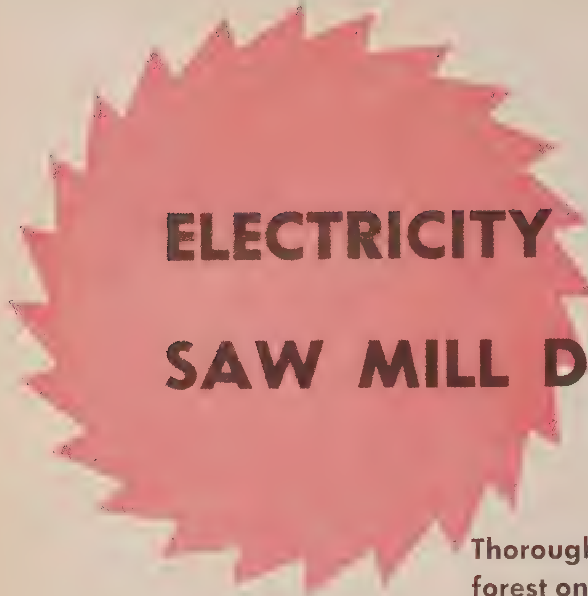
Future Years	Risk Worse Than 1957 (When t was 3.0)	1958 (When t was 4.0)
1963	0/10	3/10
1964	1/10	8/10
1965	8/10	10/10

Conclusions

1. Simulated reserve margins give a better picture of risk than percent margin alone because they recognize dispersion of actual experience about average values. These margins are normally distributed.
2. Ratio of monthly mean to standard deviation of week-day margins ($t = \bar{x}/\sigma$) is a useful measure of risk, with risk high when t is low. High risk results from low margin, high variability, or both.
3. Exact level of risk selected as a design objective is not as important as having a unit actually available on or before its target date.
4. Simulation studies of future margins can foretell when a generator unit is needed and the odds on the consequences of not having it by that date.

References

1. Program for Planning, J. K. Dillard, H. K. Sels, *Electric Light and Power*, Vol. 37, No. 4, February 15, 1959, pp. 50-52.
2. Model Shows Generating Capacity Available, C. J. Baldwin, J. E. Billings, *Ibid*, Vol. 38, No. 4, February 15, 1960, pp. 69-73.
3. Load and Capacity Models for Generation Planning by Simulation, C. J. Baldwin, C. A. DeSalvo, C. H. Hoffman, E. C. Plant, *AIEE Transactions*, Vol. 79, Pt. III, 1960. (TP 60-156).
4. The Use of Simulated Reserve Margins to Determine Generator Installation Dates, C. J. Baldwin, D. P. Gaver, C. H. Hoffman, J. A. Rose. *Ibid*, (TP 60-251).



ELECTRICITY BOON TO SAW MILL DEEP IN BUSH

Thorough analysis sold saw mill operator in heart of Quebe forest on economic advantages of electric power over diesel powe despite high cost of 25-mile line extension required to serv his load.

By LAURENT BOSSE,
Consultant, Quebec Power Company, Quebec, Province of Quebec, Canada

DEVELOPMENT of an economically advantageous plan to electrify a saw mill and lumber camps deep in the bush—that was the challenging problem.

The enterprise, which had been in existence for 25 years was using diesel motors for all its needs. The owner, entirely satisfied with the way his mill was running, had never dreamed of electrifying it; he was even planning to move further into the bush. The job of convincing him was a long and hard one, because in addition to selling the idea of using electricity, it was necessary to have him accept the additional cost involved in the construction of the line to service him: 2 miles of line on a contributory basi and five additional miles at ful cost.

Thorough study of the case wa required in order to submit to th proprietor a plan which demonstrated the real advantages of thi complex electrical installation These advantages are:

(a) More flexibility in the general organization of the mill

(b) Greater facility in recruitin and retaining manpower o account of improved working conditions.

ELECTRIC MOTOR REQUIREMENTS FOR SAW MILL

Log saw	100 hp	Barker	40 hp
Friction	40 "	Barker	25 "
Log shifter	20 "	Stock transfer	3 "
Skidway	5 "	Stock transfer	2 "
Wheel	3 "	Chips elevator	3 "
Saw guide	1½ "	Screening rejector	2 "
Log elevator	2 x 10 "	Sawdust conveyor	2 "
Feed table	1½ "	Mechanical screen	10 "
Take-away table	1½ "	Chipper	125 "
Edger saw feeder	7½ "	Chipper feeder	15 "
Edger saw	100 "	Air compressors	2 x 15 "
Feed back	3 "	Conveyors	6 x 3 "
Edger feeder	10 "		7 x 5 "
Edger	40 "		3 x 2 "
Chain	3 "		1 x 10 "
Gang saws	25 "	Transfer	3 x 3 "
Barker feeder	7½ "	Rollers	3 x 5 "
Barker feeder	5 "	Steam boiler	200 "

eft, electrification has paid off for this saw
nill in heart of Quebec forest, 25 miles distant
rom nearest power source. Center, prior to
lectrification, the saw mill had this appear-
ınce.

(c) Increased efficiency with fewer hands.
(d) Better regulated speed in all operations.
(e) Time saved by quick starting in cold weather.
(f) More readily automated and more easily operated.
(g) Cleaner and less hazardous for fires due to the absence of a reserve of motor fuel.
(h) Considerable reduction in insurance rates.
(i) Output increased up to 300 percent with a smaller staff.
(j) As a result of automation, one man can control the arrival of the logs, the placing of them on the saw-table and in the conveyor, sawing and grading.

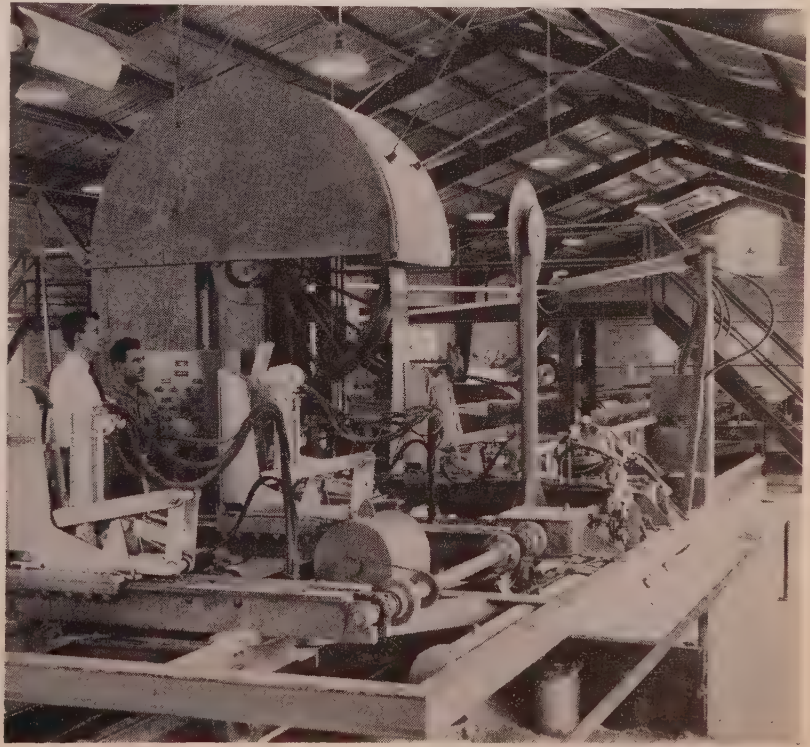
In fact, after the complete elec-
ification of the mill there were
nly six operators left in the whole
nterprise, which is very remark-
ble. The work is now done by
achines of various sizes. An elec-
ic steam boiler heats the build-
gs, an automatic control cuts
own the electricity during the
eak hours. Sufficient lighting and
modern kitchen complete the
ectrification of the mill.

With all operations electrified,
,000 ft of wood can now be proc-
sed in a day instead of the 15,000
which was the maximum output
ith the old mill.

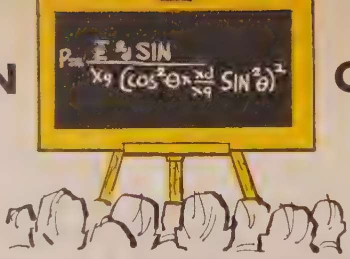
Total electric demand is about
0 hp, with the possibility of
aching 1200 hp.

Today the proprietor is proud to
ve such an installation in the
ry heart of the forest. It is his
inion that his mill is the most
-to-date in the province of Que-
c, besides being the most auto-
atic, which would have been im-
ssible with the use of the diesel
otors. The morale of the work-
en has been boosted as they no
ger have the impression of be-
cut off from civilization.

Electricity's contribution to modernization of the saw mill operations is evident in this interior view.



INDUSTRY IN CONFERENCE


P = E e SIN / Xq (cos²θ + xd/xq SIN²θ)²

Soviets Not Ahead In Nuclear Power But Take Huge Propaganda Strides

The Soviet Union is not outstripping the United States in the realm of nuclear power production, said Walker Cisler, president, Detroit Edison, as he reported on two recent trips to Russia. He spoke before the American Power Conference in Chicago, March 29-31. His overall comment was that "the Soviet electric power industry is now in a general state of development equivalent to ours some 25 years ago."

However, the Communists have been much *too* busy in other areas. Frank R. Barnett, of the Richardson Foundation, warned that "Communist 'peace charades' can disorient the West, prevent scientists from developing new weapons, and erode the will of Americans to pay for an adequate defense."

According to him, the manipulation of massive public opinion has become a *primary* weapon in the arsenal of International Communism. He suggested three big jobs to counteract Khrushchev & Co.: (1) To alert our own people to the scope, special nature and complexity of the Communist threat; (2) To create new machinery inside government that can protect the geopolitical and psychosocial terrain; and (3) to motivate the conflict-minded leadership in American life (business, law, banking, publishing, etc.) to volunteer for cold war service.

Specifically, he suggested: (1) The appointment of a Secretary of Non-military Warfare, one who would be on a par with Secretaries of Army, Navy and Air; (2) Establishment of a Board of Economic Warfare, which would be independent of both State and Defense; and (3) A NATO general staff for ideological, political and economic affairs. In addition, he recommended restudying the possibility of setting up a volunteer Freedom Legion.

Profit, the very concept upon which depends the direction of our economy, is, today, a nasty word, said John R. Conrad, president S&C Electric Co. Its pursuit is held in wide disrespect and looked at with many a jaundiced eye. Such motivations as selfishness, avarice and thirst for power are associated with the profit concept.

"If these notions are not dispelled in this coming decade, if we are unsuccessful in bringing into focus the constructive aspects of profit, our economy . . . and/or our electric power industry . . . will degenerate into complete atrophism," he warned.

"It is the *concept* of profit, and not the word, that must be reunited with morality," he stated.

Papers Trace Industry Growth Problems

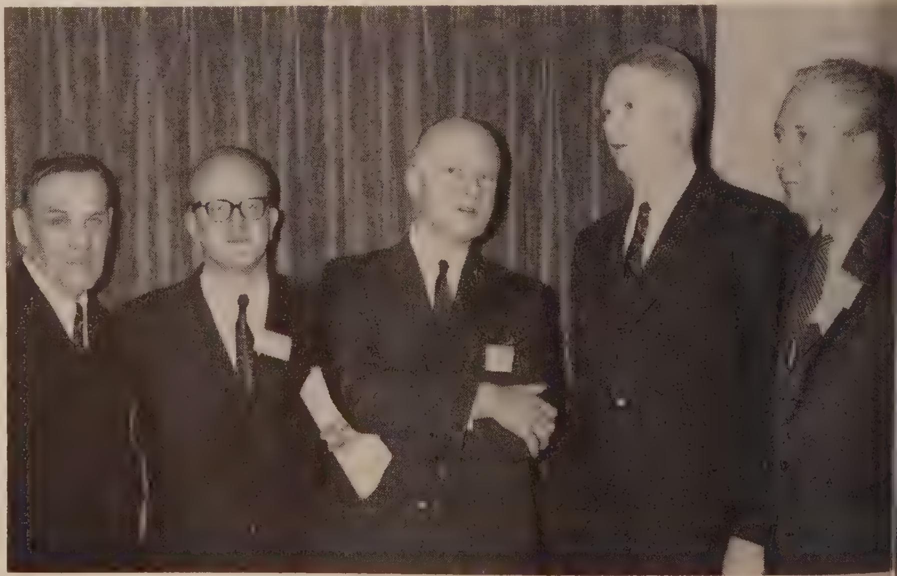
"The world faces an energy bankruptcy unless new power sources are soon developed," declared Dr. Charles A. Escoffery, International Rectifier Corp. The world's energy consumption during the coming century is estimated at about 487x10^{18} Btu, and the world's total economically recoverable fossil fuel reserve is estimated at only 27x10^{18} Btu, he said.

But, if we could harness all the solar energy that falls on a little more than 6000 sq mi of the earth's surface, we could supply all the world's current needs," he noted.

To harness sunshine and turn it into useful energy, Dr. Escoffery places some hope in the photovoltaic process, that is transforming sunlight directly into electric power without an intermediate heat cycle. A silicon solar cell will do this, although its maximum efficiency is estimated to be less than 20 percent, he reported.

Boiler Tube Life

A description of methods which have been developed to provide a reasonable basis for predicting the life before rupture of boiler tubes in which some reduction of wall



Opening session speakers included (l-r): Professor Ben G. Elliott, U. of Wisconsin; John Conrad, S& Electric Co.; Hon. J. H. Wakelin, Jr., USN; W. A. Wallis, U. of Chicago; and H. A. Leedy, Illino Institute of Technology.

hickness by wastage has been neasured was presented by J. L. Menson, W. L. Harding, and E. P. Petit, all of Combustion Engineer-ng, Inc.

Basic concepts of the approach ncluded the following steps: (A) Evaluation of rupture strength data or the material; (B) Evaluation of vastage rate and metal temperature or a particular boiler; (C) Calcula-ion of increasing hoop stress with ime as wastage occurs; and (D) Prediction of time-to-rupture with ncreasing stress.

This method of predicting the perating life of tube materials rovides information which is in-aluable for: economic studies, cheduling outages, and operation nowledge.

Automatic Read-out For Calculators

Equipment which automatically rints the output data from an a-c etwork calculator study on a sin-le-line diagram of a power system as been designed and is being uilt, according to O. J. Wallace and odney Gilbreath, both of Westing-ouse Electric Corp. The equipment programmed by a paper tape.

A typewriter is used both to pro-ram a tape which controls the quipment and to print out the data. ector multiplication of a-c current nd voltage is done by a Hall gen-rator, and analogue-to-digital con-ersion is handled by a transistor-ed digital voltmeter.

The authors stated that the equip-ent is designed to be used by per-nnel without additional training. rogramming a tape for a given udy should be easier than plug-ng up a plotting table for the same udy, and requires no new skill ex-pt the ability to do hunt-and-peck pewriting.

The balancing process involves less eyestrain on the part of the operator and no errors in meter reading can occur. The time to read out a system is cut at least in half, and operator fatigue and reading errors are eliminated. A given board operation using this equipment could undoubtedly be carried on with a considerable reduction in personnel, they said.

Low Level Economizers

While only fragmentary information is available at this time on the performance of low-level economizers, and most of that is restricted to full-load conditions, J. H. Potter, Stevens Institute of Technology said, "calculations indicate that there is ample justification for the low-level economizer. Some of the large utilities have already installed such units.

Operating experience on a large unit using the low-level economizer for air tempering, has been gained at Dayton Power & Light. Although part-load information is not available now, it is estimated that at an average temperature of 52F, for 8500 hours a year, at 26 cents per million Btu, this annual fuel savings will amount to $21,400, he said. Reduction of the gas temperature entering the induced draft fan resulted in a saving of 70 hp in fan power. Also, use of the low-level economizer element saved extraction steam equivalent to an energy production of 5000 kw, worth $160,000, he said.

Microwave Relaying Highly Reliable

Microwave—a relatively new tool of the relay art has been a successful and economically sound venture over a more-than three-year period. According to J. L. Harmon at Cleveland Electric Illuminating, after a two-year trial period with a pilot link, in June, 1959 the company installed its first microwave relaying link which supplies a medium for transfer-trip protective relaying on two 132-kv lines between two major substations. Today, there are ten microwave and two co-axial cable terminals in service between various substations and plants.

Total system reliability has been good. For 913,896.0 channel hours, percent reliability has been as follows: Radio frequency, 99.94 percent; Wide Band, 99.92 percent; Narrow Band, 99.95 percent; and Sub Carrier, 99.93 percent.

Future needs of the power system are going to require faster and faster relay action, and performance as well as simultaneous multi-terminal clearing of faults. Microwave with its built-in reliability and speed of response will supply the needed media, Mr. Harmon said.

Better Lightning Performance Prediction

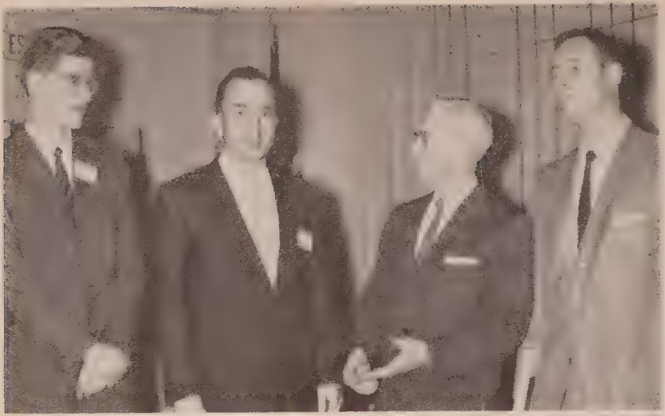
A new method for predicting transmission line lightning performance is being refined by Dr. C. F. Wagner and A. R. Hileman, both of Westinghouse Electric Corp.

While more refined information concerning stroke characteristics is being sought, a number of conclusions concerning performance of the lines and characteristics of lightning can be drawn, said the authors.

1. The voltage appearing across an insulator string of a transmission line tower struck by lightning can be resolved in two components: (a) That due to the current fed into the system from the stroke, and (b) That due to the changing charge in the stroke above tower.
2. By field theory analysis it has been demonstrated that the component produced by the current fed into the structure can with sufficient accuracy be computed by conventional wave theory methods provided the proper values of surge impedance are used.
3. By field theory analysis it has also been demonstrated that the component produced by the charge above the tower can also be computed with sufficient accuracy by a simplified method.

(Continued on next page)

Lightning strikes in two parts—or should be considered so. From left: Dr. C. F. Wagner, A. R. Hileman, both of Westinghouse, and Dr. E. T. B. Gross, Illinois Institute of Technology.



Economic condenser tube sizes by Computer Calculation were discussed by (l-r) C. E. Person, F. V. Miholits, M. J. Archbold, and Ami Leidner, all of Commonwealth Edison.

4. The relative importance of these two components is dependent upon the assumed stroke characteristics. For wave fronts shorter than two microseconds, the current effect is the more important, and for longer fronts, the charge above the tower is the more important.

5. In the author's opinion, the effect of the charge above the tower offers the most reasonable explanation of the high outage rates presently being experienced on some EHV lines. Presently available data indicate that the stroke currents are concave upward and, in the authors' opinion, point strongly to an equivalent front in excess of two microseconds.

BFP Selection

J. C. Beres and R. W. Potts, both of Commonwealth Associates, Inc., presented results of a study that was made in selecting the most economical boiler feed pump and drive arrangement for a 265-mw unit, one of two to be installed in the Great Lakes region.

As a basis for evaluation, the following criteria were established: (1) The net kw capability with any of the boiler feed pump drive arrangements to be the same; (2) An average unit capacity factor of 0.63 for 35-year life; (3) Expected coal cost of 40 cents per million Btu at the start-up date and increasing at the rate of two percent per year for the 35-year life; (4) Comparable reliability of arrangements as far as possible. When this is not possible, an outage penalty for the anticipated difference in down time is applied; (5) Main turbine-generator exciter to be driven off the main turbine-generator shaft with any boiler feed pump drive arrangements; and (6) Fixed charges to be at a rate of 15 percent.

Based on these established criteria and on prevailing prices when the study was made, the most economical boiler feed pump arrangement and drive for the unit is with two one-half size 3600-rpm pumps, each driven through a variable speed coupling by the main turbine with one pump connected to the HP-LP turbine-generator shaft extension. This arrangement includes gear-driven main exciters and one one-sixth size full pressure motor-driven start-up pump.

Leadville tests were outlined by L. M. Robertson, P. S. of Colorado (right), and J. E. O'Neil, Westinghouse Electric Corp.

Leadville Project In Third Year

The Leadville, Colorado EHV Test Project, now in its third year of operation was discussed in a paper by L. M. Robertson, Public Service of Colorado and J. E. O'Neil, Westinghouse Electric Corp. The project has been valuable in supplying data needed for practical, high altitude high voltage lines. Special tests have added considerable information above the basic knowledge of corona loss and RI. Tests on the original conductor configurations are now nearly completed, the authors said, and data on these conductors will soon be made available.

Since more foul weather information is desirable, continuing efforts are being made to complete this work.

Design criteria for EHV lines have been established and investigations at the site have helped solve many aspects of the problem.

Further testing will continue on smaller conductor sizes to obtain design data for 230-kv lines. These tests will use one conductor of each of the bundle-conductors now at Leadville. These (0.92 in. ACSR and 1.4-in. expanded ACSR) effectively bracket the conductors used for 230-kv lines.

"At the conclusion of the program, sufficient information will be available to meet design needs of Public Service of Colorado for many years," the authors said.

System Simulation

"Model techniques as used in the transient network analyzer solution of power systems problems have provided a wealth of practical engineering data in fields of switching surges, insulation coordination, and system protection," stated Lionel O. Barthold and Robert F. Silva, both of General Electric Co.

Problems most obviously suited to model solution are transient conditions involving relatively complex, multi-phase circuits comprised in part of distributed constant elements, and those steady-state problems involving transformer magnetization characteristics. The method is general enough to apply to countless other electrical and mechanical problems, many of them one-of-a-kind, where the low set-up cost of a model solution puts this method at an advantage.

In discussion, it was revealed that oscilloscopes are now available that will measure time of pulse travel in a one-ft-long conductor.

Economical Nuclear Power

"Electrical power will be produced with fissionable fuels cheaper than it is being produced from coal," stated C. B. Graham as he presented a paper by himself and C. R. Braun, both of Allis-Chalmers Mfg. Co. "How soon this will happen depends largely on how actively the required research and development are pursued," he said.

(Continued on page 67)

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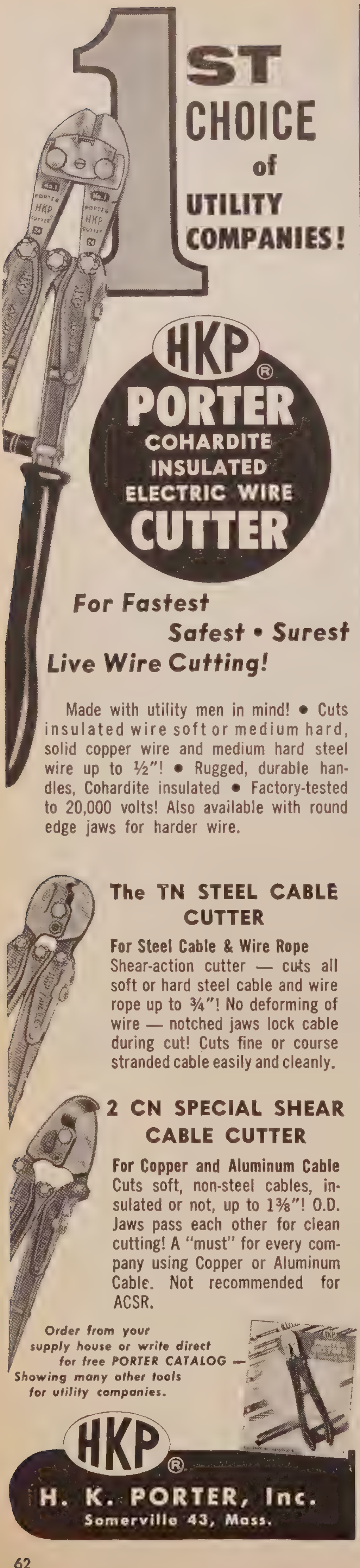
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Blow Your Own Horn, Utilities Told By Cresap

Utilities should think, speak, and write about electrical manufacturers' research as their own, according to Mark W. Cresap, Jr., president of Westinghouse Electric Corp.

"We think that on every possible occasion you should say that it is yours. We think you should claim credit for it as work done for you, carried out by agents under contract to you and largely paid for by you," he said.

Speaking to the Southeastern Electric Exchange, Mr. Cresap invited executives of the electric utility industry to join with electrical manufacturers in a program to acquaint the public with the nature and scope of the industry's unequaled research program.

"People have come to think of electric power as a steady, stable, reliable, dependable industry," Mr. Cresap pointed out. And while the industry values that attitude and has worked hard to earn it, he said, "those words 'steady, stable, reliable, dependable' give an essentially incomplete picture of the electric power industry today."

The utilities now have an opportunity to show that they are members of a progressive, research-minded industry, he went on. "This industry is not merely keeping up with the times in research—it is so far ahead of the times that it may be said to be creating the times."

The electrical industry has never conducted its research and development on a "crash program" basis, the executives were told. "Ever since the business began, year-in and year-out, in good times and bad, in peace and war, with and without government assistance, we have directed our effort toward the goal of better electrical equipment and service at lower cost."

As a result, he stated, American electrical technology has enjoyed the admiration of the world and has progressed further and faster in the past 10 years than it did in the previous 60.

Electric utilities in America produce almost half of the world's electric power and since World War II have grown at twice the rate of the rest of the economy.

"You turn out more product per worker than any other industry in America, with the possible exception of chemical processing. That record has been built on the three-point program of good management, generous capital investment and the best equipment and apparatus the research can produce.

"This is an extraordinary technological platform for you to stand on and be counted."

Hope To Energize 750-kv Line Late This Year

A 750-kv test transmission line will be constructed in western West Virginia, according to an announcement issued jointly by American Electric Power Service Corp. and Westinghouse Electric Corp. According to a Westinghouse spokesman, first tests of the line are scheduled for late 1960 or early 1961.

The project will enable the companies to determine the technical and economic feasibility of transmitting large blocks of power at voltages up to and including 750-kv.

Other manufacturers cooperating in the project include: Kaiser Aluminum—130,000 ft of ACSR in diameters ranging from .576-in. to 1.6-in.; Lapp Inculator Co., Inc.—clamps, fittings, and the grading devices for testing, for both the line and bus structures; Ohio Brass—insulators; Thomas & Betts—connectors; American Bridge Div. o U. S. Steel—six single circuit towers, six dead end structures and one sub-station.

The new EHV test project wil provide a continuation of the investigations begun with the 500-k Tidd (Ohio) test line built in 1946

According to A. C. Monteith, Westinghouse vice president, "the Apple Grove (West Virginia) project is the logical extension of the extra-high-voltage test program carried out by American Electric Power and Westinghouse with the cooperation and assistance of other manufacturers beginning in 1946."

Three test lines will be built at Apple Grove, each using a different conductor configuration. The lines will be energized simultaneously to measure radio-influence voltages and corona losses, permitting a comparison of test results under identical atmospheric conditions.

G-E Pioneers New Purchasing Concept

General Electric, as a business purchaser spending $2-billion a year with more than 45,000 suppliers some time ago came upon the realization that a dynamic, vital purchasing function could reduce the cost of doing business and increase profitability.

Productive Purchasing was the concept which evolved from this realization. According to a G-E spokesman, productive purchasing is the application of scientific method in areas beyond the product itself, seeking to appraise the *added values* which, along with the functional values, compose the *total value* of the product.

The concept is described in a new booklet, Productive Purchasing, which is available from G-E.

The publication suggests the following approach to organizing for productive purchasing:

1. Integrate the purchasing effort with other business efforts. A panel composed of representatives from engineering, marketing, finance, and manufacturing groups can provide a two-way channel of advice and information to make purchasing evaluations more meaningful.

2. Streamline purchasing procedures. Use of electronic data processing, for example, can eliminate much time-consuming checking, writing, comparing and counting—leaving more time for evaluation and decision making.

Also included are several case histories which illustrate the results of typical applications of the new concept.

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ARMOR RODS . . . Protect long-span T&D lines at supports

LINEGUARDS . . . Protect short-span T&D lines at supports

PATCH RODS . . . Repair damaged conductors

TAP ARMOR . . . Protects conductor at tapping points

FANNGRIPS . . . For dead-ending strands and conductors

FANNSPLICES . . . Join two ends of conductor wire

PLASTIC PRODUCTS . . . For conductor surface protection

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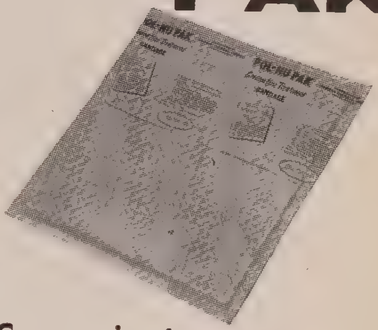

Convenient, envelope-type ground-line treatment bandage

Now line crews can apply ground-line preservative treatments to poles when they do overhead work by carrying Chapman Pol-Nu Paks on service trucks as standard equipment. This convenient pole preservative bandage, available in several sizes, comes as a completely sealed envelope which is easily opened and wrapped around the pole. Chapman Pol-Nu, grease-type pentachlorophenol compound inside the bandage, protects the critical ground-line area from decay and insures longer pole life. Mail the coupon for complete information on Pol-Nu Paks and on Pol-Nu in bulk for use with the Pol-Nu Bandage-Maker when many poles are to be treated.

Slit Pol-Nu Pak on three sides and open to expose the preservative.

Wrap the bandage around pole at ground-line and back-fill.

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Leading manufacturer of wood preservatives
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SALES CONFERENCE

(Continued from page 44)

¾ of the total heating capacity needed, the best economics might suggest that they increase the lighting just a little more to the point where it can supply *all* the heat needed.

Farm

Electric utilities, through their youth programs, can give a young person new insight into career opportunities especially in the electrical industry itself—with utilities, with equipment manufacturers, or in the field of distributing, selling and servicing electrical equipment, stated W. L. Byrne, Ebasco Services, Inc. To carry out an effective farm youth program, utilities should further the principles of cooperation, contribution and continuity.

Toledo Edison has experienced an annual increase of 12 percent compounded in the last ten years from its rural accounts, according to Wm. R. Poole, vice-president sales.

The company coped with the declining farm community population problem by calling on its Industrial Development Department to help to successfully create additional job opportunities to absorb manpower which was formerly being used on the farms.

He stated that what management should expect of its rural sales department included: (1) To increase the company's revenue; (2) To improve the overall area economy; (3) To build customer confidence and good relations with your company; and (4) To assist in developing rural educational programs.

The rural sales department should be able to expect management to take the time to tour the area to see what is going on in modern agriculture. This paid off in two ways, he said: Recognition was made of effort and accomplishment and further enthusiasm was stimulated among sales people.

The core and substance of the conference was aptly summed up thus:

America's electric utilities should "Sell Electric All the Way," according to C. M. Wallace, Jr., vice-president, Georgia Power. Unless they do, he said, there is little hope that the 1969 goal of 7000 kwh per residential customer will be achieved.

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POWER CONFERENCE

(Continued from page 60)

"We neither expect nor do we need any 'breakthroughs'."

Since the authors believe competitive nuclear power cannot be achieved by a few prototype plants, and that a "wait and see" attitude should *not* be adopted, a sufficient number of reactors are needed in operation "to evaluate the various design features, to demonstrate the operating and maintenance costs, to prove out the higher power densities, and to demonstrate improved fuels as they are developed.

Their discussion revolved about the Pathfinder Project. In discussion, the authors stated that 500-mwe is the crossover point between shop and field fabrication of nuclear power plants of the Pathfinder type.

While B. L. Lloyd and W. L. Budge, both of Westinghouse also believe that some day nuclear power will become competitive, they believe that in most systems where nuclear plants are competitive, the best future economic patter will contain an optimized combination of nuclear and conventional plants.

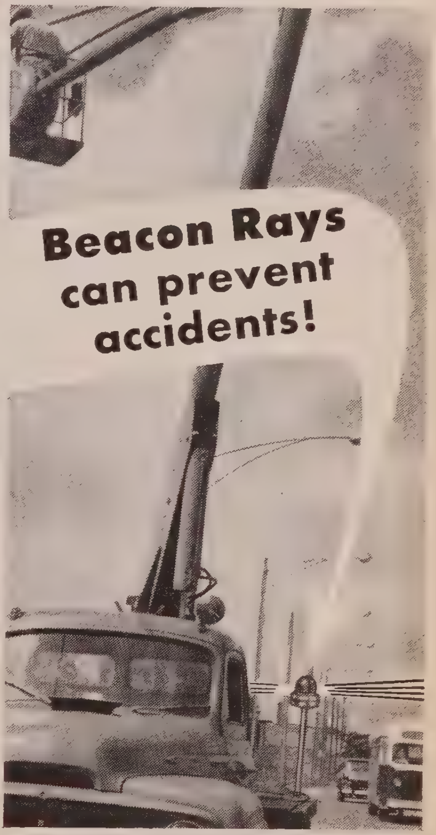
"For most systems," they said, "nuclear plants will take over the base load, high load factor portion of the load duration curve. Conventionally fueled plants will serve the upper portion of the curve. Nuclear units will be applied and should be evaluated as high load factor generating sources."

Based on the cost versus size relationship for nuclear and conventional plants, it appears that for some time to come nuclear plants will only prove competitive in the very large sizes, they added.

Future trends in fuel costs for the two fuel types must be evaluated very carefully in arriving at an economic selection. This may well show that nuclear plants will be competitive in some areas more rapidly than was previously anticipated.

The annual carrying charge rate must also be subjected to careful evaluation. Any comparison must reflect accurately the *true* cost of carrying the additional capital investment in nuclear plants, they concluded.

AVOID THAT CRASH
be neither
CAUSE nor VICTIM



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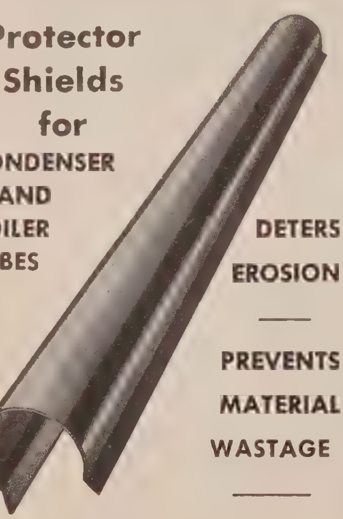

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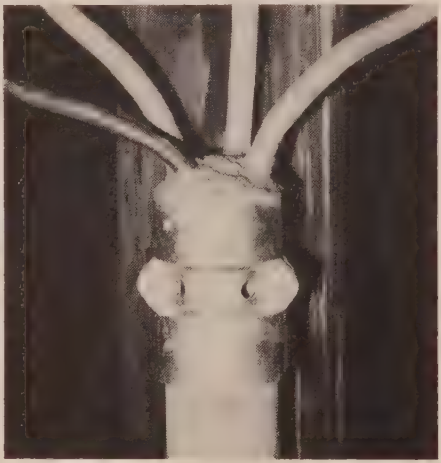

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Current Transformer

Type OTR outdoor current transformer is available in three voltage ratings. Accuracies and dimensions meet all requirements of ASA, NEMA, and EEI. Ratings of 1200 through 5000 amperes with 5 ampere secondary and for use on circuits through 15 kv. The window type transformer by **Standard Transformer Co.** has minimum radio interference and low power factor. Double ratio units also available.

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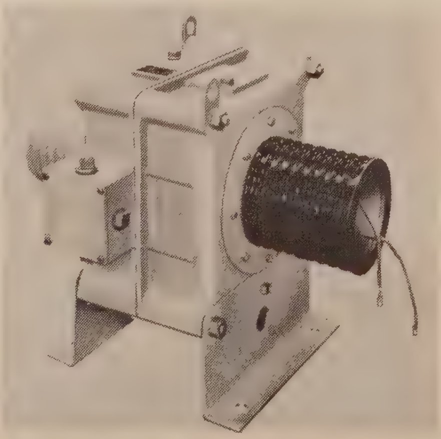

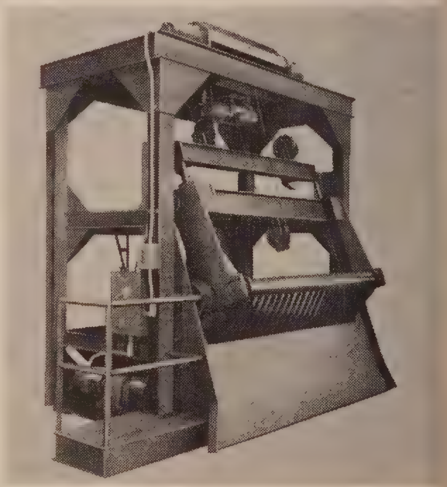

Trash Rack Rake

A self-dumping log grapple trash rack rake has been introduced by **Allis-Chalmers Mfg. Co.** The new rake has its teeth retracted when decending with sufficient space between the rack bars and the teeth on the basket to clear the accumulated trash against the bars. When ascending, the rake's teeth engage the rack bars to clean the trash which is dumped into a car. Available in sizes from 6- to 12-ft.

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Positioning Cylinder

A transverse positioning cylinder for use on the 6800 derrick with all **Holan Corp.** hydraulic earth borers has been announced. The new cylinder enables the operator to move the digger sideways and is a working companion of the longitudinal cylinder which has been available for some time. Enables curbside boring with the vehicle parked at only slight angle, reduces truck maneuvering, maintains straight-line feed, etc.

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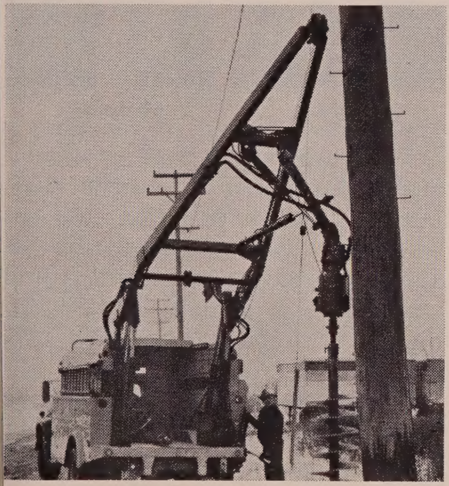

Portable Distribution

Porta-watt portable distribution system, designed primarily for use with gasoline-operated generators, makes it possible to operate flashing warning lights, tools, heaters, pumps, and other electrical equipment wherever the truck may be. Units are waterproof, connectors are polarized to restrict use, panel has circuit breaker protection against overload. Will handle eight circuits, either steady or interrupted. Available from **Whitney Blake** Co.

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YOU ASKED FOR IT!
the NEW DAVIS Self-Propelled T-66 TRENCHER
is built to your specifications
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features Positive Traction...Hydraulic Variable Speed Drive
Convenient Control...Virtually Effortless Operation

Here's the finest, most advanced utility trencher available. The Davis T-66 has been designed and produced after an exhaustive survey determined the features users really wanted. Every one of its 1350 pounds is packed with performance to handle 9 out of 10 jobs with such efficiency and economy that you're bound to make more profit. And, it's priced far less than you would expect.

Positive traction, accurate speed control, and distribution of power where you need it is obtained through the use of tracks and a variable speed hydraulic drive. Boom is operated hydraulically for depth control, and it has a built-in pre-loaded shock absorber which cushions the shock but doesn't absorb the power. Everything is designed for the operator's comfort and convenience — requiring very little skill or effort. It digs 3″ to 4″ wide to 66″ deep; or 12″ wide, 30″ deep and at varying widths and depths in between. Only **two tooth combinations** are required to let you **dig** at all widths. It trenches from 1-ft. to 12-ft. per minute depending upon soil conditions. It is compact, only 37″ wide. The Davis T-66 is quality built in every part. It pays off in 33 ways!

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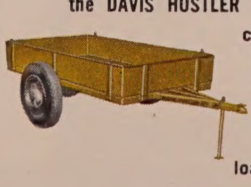
DOES ITS OWN BACKFILLING

The Davis T-66 has a low-cost, well designed, hydraulically controlled angle backfill blade. The T-66 has two-speed drive with instant forward and reverse, powered steering, independent left and right positive clutches and disc steering brakes for maneuverability in backfilling.

the DAVIS PUP TRENCHER digs by itself

Self-propelled by positive 6-speed winch drive. Digs 2″ to 3″ wide to 36″ deep; 4″ wide, 18″ deep. Low cost.



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MEN OF POWER

Elect Three at Baltimore G & E

At a recent Board of Directors Meeting of Baltimore Gas and Electric Company, Thomas W. Trice was elected Vice-President (Electric Operations), Thomas E. Marburger, Vice-President (Engineering and Construction) and Joseph R. Weger, Assistant Secretary and Assistant Treasurer.

Mr. Trice worked for Duquesne Light Company for seven years before joining the Baltimore Gas and Electric Company's organization in 1935. He was assistant general superintendent, electric operations, from 1942 to 1950, when he was advanced to General Superintendent, Electric Operations.

Trice

Marburger

Mr. Marburger is the former general superintendent, electric engineering and construction. He entered the Company's service in 1922 as a student apprentice and was assistant general superintendent, electric operations, from 1951 to 1957.

Mr. Weger is a Certified Public Accountant and member of the Bar

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in Maryland. He has served in the accounting organization of Baltimore Gas and Electric Company since 1933, having been supervisor of Tax Accounting since 1942.

MacInnes To Head S. E. E.

William C. MacInnes, president of Tampa Electric Co., was elected president of the Southeastern Electric Exchange for 1960-61 at the organization's 27th annual conference, which concluded at Boca Raton March 23. Mr. MacInnes had been serving as first vice president of this group during the past year.

Consumers Power Ups Two As Karn Retires

Alphonse H. Aymond, Jr., former
xecutive Vice President, has be-
ome Chairman of the Board and
hief executive officer of Consumers
ower Co.

He succeeds Dan E. Karn who re-
ired April 30 as President of the
ompany. The Board of Directors
as elected two other officers to top
xecutive positions effective May 1,
960.

James H. Campbell, former Sen-
r Vice President, has become
resident and chief operating of-
cer.

Mr. Karn has been retained by
e Company as a consultant. He
ecame Chairman of the Finance
nd Budget Control Committee,
cceeding Justin R. Whiting, for-
er chairman of the board and
esident, who has retired from this
airmanship. Mr. Whiting contin-
es as a director.

rris Named Marcus VP

Edgar A. Farris, Jr. has been ap-
inted to the Board of Directors
d elected to the position of Vice-
esident in Charge of Engineering
the Marcus Transformer Com-
ny. Prior to his promotion, Mr.
rris was Chief Engineer of the
nsformer manufacturing firm.

Mr. Farris is nationally recog-
ed as an authority in his field and
ce joining the company in 1956,
has been instrumental in devel-
ng new lines of electric lighting
nsformers. He was formerly
nected with the ITE Circuit
eaker Co. and the Standard
nsformer Co.

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CALENDAR OF EVENTS

May 2-4—Edison Electric Institute, Purchasing and Stores Committee, Annual Meeting, The Warwick, Philadelphia, Pa.

May 9-11—Edison Electric Institute, Second Financial Conference, LaSalle Hotel, Chicago, Ill.

May 9-12—Instrument Society of America, National Power Instrumentation Symposium, Brooks Hall, San Francisco, Calif.

May 10-12—American Institute of Electrical Engineers, Farm Electrification Conference, Sheraton-Fontenelle Hotel, Omaha, Neb.

May 12-13—Edison Electric Institute, Transmission and Distribution Committee, Penn Sheraton Hotel, Pittsburgh, Pa.

May 12-13—Public Utilities Advertising Association, Annual Convention, Waldorf Astoria Hotel, New York, N. Y.

May 12-13—Pennsylvania Electric Association, Industrial Sales Conference, Skytop Club, Skytop, Pa.

May 15-17—Wisconsin Utilities Association, Accounting Conference, Lake Lawn Lodge, Delevan, Wisc.

May 16-17—Edison Electric Institute, Electrical System and Equipment Committee, Baker Hotel, Dallas, Tex.

May 16-18—Pacific Coast Electrical Association, Annual Convention, Stardust Hotel, Las Vegas, Nev.

May 19-20—Pennsylvania Electric Association, Transmission and Distribution Committee, Berkshire Hotel, Reading, Pa.

May 23-25 — Northwest Electric Light and Power Association, Business Development Conference, Chinook Hotel, Yakima, Wash.

May 24—Electric Companies Public Information Program, Mid-Atlantic Regional Meeting, Rochester Gas and Electric Corp.'s Employee Center, Rochester, N. Y.

June 2-3—Southeastern Electric Exchange, Industrial Power Sales Conference, Battery Park Hotel, Asheville, N. C.

June 5—Electric Companies Public Information Program, Steering Committee Meeting, Atlantic City, N. J.

June 6-8—Edison Electric Institute, Annual Convention, Atlantic City, N. J.

June 15-17—National Committee for Utilities Radio, 1960 Annual Meeting, St. Petersburg, Fla.

June 19-24—American Institute of Electrical Engineers, Summer General Meeting, Chalfont-Madden Hall, Atlantic City, N. J.

September 7-9—Northwest Electric Light and Power Association, Annual Convention, Glacier Park Lodge, Glacier National Park, Mont.

September 28-30—Indiana Electric Association, 51st Annual Convention, French Lick-Sheraton Hotel, French Lick, Ind.

October 5-7—Wisconsin Utilities Association, Electric and Gas Sales and Operating Sections Convention, Schroeder Hotel, Milwaukee, Wisc.

October 9-14—American Institute of Electrical Engineers, Fall General Meeting, Morrison Hotel, Chicago, Ill.

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